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## DISEASES DUE TO PROTOZOAN PARASITES.

ROBINSON (E. M.). **Serological Investigations into Some Diseases of Domesticated Animals in South Africa caused by Trypanosomes.**—*Union of South Africa. Dept. of Agric. 11th & 12th Reports of the Director of Veterinary Education and Research.* 1926. Sept. Part I. pp. 9–25.

In this paper the author describes his experiments in connexion with the diagnosis of dourine and nagana by means of the complement fixation test, and gives brief accounts of the application of the Sachs-Georgi test and the Meinicke lipoid fixation reaction.

For the preparation of antigen for the complement fixation test WATSON'S technique is followed, the blood of white rats being used. The trypanosomes obtained were stored with two volumes of WATSON'S glycerin formalin preservative at 35° F. It is stated that if the antigen is kept at this temperature formalin is unnecessary.

All sera were inactivated at 62° F. because it was found that non-specific reactions were obtained if a lower temperature were employed. It was also found that non-specific reactions were obtained with some donkey sera even when heated to 62° C.

In the experiments connected with the diagnosis of nagana the antigen used was the same as for the dourine tests. Shortage of white rats prevented the preparation of antigen from *T. brucei* or *T. congolense.* The animals tested were all experimentally infected with pure strains of *T. brucei* or *T. congolense.*

Although it was found possible to transmit the strain of *T. congolense* to guineapigs these furnished no satisfactory antigen. The few tests that were carried out were done with antigen made from infected white rats. Even these, however, produced only a small amount. Sera from animals infected with *T. congolense* gave no reaction with *T. equiperdum* antigen, but those infected with *T. brucei* gave as strong reactions with the *equiperdum* antigen as animals infected with dourine.

A small amount of evidence was obtained that the sera of *congolense*-infected animals will react with *congolense* antigen whereas the sera of animals infected with *T. equiperdum* react slightly or not at all.

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The sera of cattle infected with *T. vivax* gave no reactions with *T. equiperdum* antigen.

With the Sachs-Georgi test a number of variable results was obtained with the sera of about a score of animals which were tested at intervals of a week to a fortnight.

A tabular statement gives the results obtained with the Meinicke lipoid reaction. The test would appear to be less specific than the complement fixation test.

BEVAN (Ll. E. W.). **The Influence of Dipping in Solutions of Arsenic upon the Course of Trypanosomiasis.**—*Jl. Comp. Path. & Therap.* 1926. Dec. Vol. 39. No. 4. pp. 284–292.

In view of the results achieved in the control of tick borne diseases by short interval dipping, it has frequently been suggested that dipping might play a part in the control of trypanosomiasis in one or more of the following ways: (1) By poisoning the fly taking blood from a skin in which arsenic had been deposited; (2) by destroying trypanosomes in flies imbibing such blood; (3) by rendering the fly infertile; (4) by protecting the animal into which infective material was injected by the fly in the act of biting.

To begin with experiments were carried out upon guineapigs. Great care has to be taken that none of the dip is swallowed, and bedding had to be withheld until the animals were dry. In dull damp weather, when drying occurred slowly, there was a risk of scalding, and, in fact, this caused the death of a few animals. Two strains of trypanosomes were used. One of these was from a native, and the other from a donkey. The strains were morphologically identical. The dip used contained 0·16 per cent. of arsenious oxide. For three day dipping it was used in the proportion of 1 gallon to 300 and for weekly dipping 1 to 156.

Dipping guineapigs in the weaker solution failed to drive trypanosomes from the blood. But dipping in the stronger solution at intervals of three or four days did clear the peripheral circulation for short periods after 3 to 6 dippings. Similarly the weaker solution did not protect animals against syringe infection. Dipping the animals in the stronger solution at 3 and 4 day intervals did cause delay in development of the disease, the delay persisting while dipping was continued. When this was suspended, the infection developed. In one experiment, dipping on three consecutive days in the strong solution did cause the permanent disappearance of the parasite.

The facts suggest that it is the accumulation of arsenic that is responsible for the results, but the result is an arrest of the development of the parasite rather than its destruction.

Immersion of infected guineapigs in cold water hastened the development of the disease.

The fact that thin skinned animals like guineapigs could be dipped on consecutive days with a dip at a strength designed for weekly dipping is striking. They were, however, able to tolerate this only provided drying was rapid. It is suggested that tests should be carried out to see whether shorter interval dipping might be tolerated by cattle.

A few experiments with cattle yielded inconclusive results owing to the scarcity of parasites in the peripheral blood.

BRITISH MUSEUM

VAN SACEGHEM (R.). *Trypanosoma congolense* dans l'Est Africain. [*Trypanosoma congolense* **in East Africa.**]—*Bull. Agric. Congo Belge.* 1925. Sept.–Dec. Vol. 16. Nos. 3–4. pp. 569–571.

In this brief note the author reports the results of a few inoculations of dogs with *T. congolense*. He finds that the period of incubation is shorter, and death takes place more rapidly when dogs are inoculated with blood from infected dogs than when the infective blood is taken from cattle.

VAN SACEGHEM (R.). La formol-gélification et le diagnostic des trypanosomiases chez les bovidés. [**Formol-Gelification and the Diagnosis of Bovine Trypanosomiasis.**]—*Bull. Agric. Congo Belge.* 1925. Sept.–Dec. Vol. 16. Nos. 3–4. pp. 571–573.

The author's test have been carried out by adding 2 drops of commercial formalin to 1 cc. of serum. It is not stated at what temperature the tubes were kept.

The serum of 15 bovines infected with *T. congolense* or *T. vivax* were tested and the period required for gelification ranged from 5 minutes to 24 hours. Seven healthy controls gave periods ranging from 25 minutes to 7 days.

The conclusion is drawn that the test is of no value.

Citrated plasma also gave results of no value.

NIESCHULZ (O.). Zoölogische Bijdragen tot het Surraprobleem. V. Overbrengingsproeven met *Haematopota cingulata* Wied. [**Contribution to the Surra Problem. V. Transmission Experiments with** *Haematopota cingulata.*]—*Veeartsenijkundige Mededeeling.* 1926. No. 57. *Departement van Landbouw, Nijverheid en Handel.* 10 pp. With 1 text fig. Archipel Drukkerij-Buitenzorg.

Of 677 Haematopota caught in the neighbourhood of the breeding station at Pengarasan in January 1926, 315 were *H. cingulata*. This species does not occur in the neighbourhood of Buitenzorg. The flies used in the experiments had therefore to be taken a day's journey before they could be used for experiment. Of 820 caught, 319 arrived alive and 73 were used for experiments.

In an experiment in which these flies were transferred direct from an infected to healthy horse, infection resulted. In a similar experiment in which 22 flies were used the result was negative. Fifteen flies were used in an experiment in which after sucking blood from an infected animal for two minutes they were transferred after the lapse of half an hour to a healthy animal. The result was positive. In a second experiment of the same kind 29 flies were used and half an hour elapsed between feeds; the result was negative. In one experiment in which 4 flies were used an interval of one day elapsed between feeds. The result was negative.

KIMURA (T.), FUKUSHIMA (T.) & FUJII (T.). **Pathological Anatomy of Experimental Trypanosomiasis of the Horse.**—*Sei-I-Kwai Med. Jl.* 1926. Aug. Vol. 45. No. 4. pp. 1–5.

The trypanosome used was obtained by subinoculation from the blood of a buffalo in Formosa, and it was thought to be *T. evansi*.

Eight Korean ponies were used and death occurred in from 38 to 117 days.

Microscopic examination revealed the following lesions. Round-celled infiltrations in the heart muscle. In some cases there was a similar lesion in the skeletal muscles associated with atrophy and waxy degeneration. The brain and meninges showed perivascular infiltrations.

Haemosiderin deposits were found in the spleen, liver, bone marrow and lymphatic glands. There was also small haemosiderin granules in the glomeruli, alveolar walls, mucous membrane of the intestines, and thyroid epithelium.

BRUNI (N.). Observations et recherches sur *Trypanosoma lewisi* et *Schizotrypanum cruzi*. [**Trypanosoma lewisi** *and* **Schizotrypanum cruzi.**]—*Bull. Soc. Path. Exot.* 1926. Nov. Vol. 19. No. 9. pp. 791–794.

Of 103 rats examined at the Military Hospital at Bologna, 56 were found to be infected with *T. lewisi*. As a result of examinations carried out at different seasons of the year the author has not been able to establish any special seasonal incidence. He has however found that while in one building a high proportion of the rats may be infected, in a neighbouring one the percentage infected may be low. In one instance a heavily infected pregnant female was caught. The trypanosome was not found in the young rats at birth. The infection has not been transmitted to white rats placed in cages along with wild rats which had both lice and fleas on them. Nor has it been found possible to infect rats by feeding them upon infected blood and organs. Intraperitoneal inoculation of white rats has always caused severe infection, and of 20 inoculated only two survived and recovered.

Examinations of the alimentary contents of fleas and lice caught on infected rats has in no instance revealed the presence of any flagellate forms of any kind.

In carcases preserved in cold store, the trypanosomes retain their vitality for a considerable time, and in moist preparations under cover glasses trypanosomes have remained alive until the fourth day.

Two pregnant guineapigs infected with *S. cruzi* aborted on the 16th day, and though the blood was rich in the parasite, none could be found in the foetuses.

Twelve white mice which were inoculated died in 2–3 days. The feeding of mice with infected organs has failed to transmit the infection.

The author has failed to infect frogs (*R. esculenta* and *viridis*), and toads (*B. vulgaris*).

i. VAN SACEGHEM (R.). Contribution à l'étude du " 309 " Fourneau dans les trypanosomiases animales. [**"309" Fourneau and Mammalian Trypanosomiasis.**]—*Bull. Agric. Congo Belge.* 1925. Sept.–Dec. Vol. 16. Nos. 3–4. pp. 574–578.

ii. ———. Le bismuthoidol dans le traitement trypanosomiases animales. [**Bismuthoidal in the Treatment of Animal Trypanosomiasis.**]—*Ibid.* pp. 578–582.

i. The author has used the drug in 25 per cent. solution in distilled water by intravenous injection to cattle.

With a dose of 2·3 g. per 100 kilos. body weight the circulation was cleared for periods not exceeding seven days. Similar results were obtained with *T. vivax cazalboui*. A dose of 4 grammes was toxic.

ii. The strength of the colloidal solution used is not stated, but doses ranging from 10 to 40 cc. were given intravenously to animals ranging from 200 to 350 kilos. in weight. In no case did trypanosomes (*T. vivax cazalboui*) disappear from the circulation for more than a few days.

Parallel results were obtained in two experiments carried out on animals infected with *T. congolense*.

One bovine weighing 225 kilos was given 20 cc. of the solution when trypanosomes were present in the circulation and these disappeared two days later and are said not to have reappeared.

LEDENTU (G.). Sur le pouvoir protecteur du sérum sanguin vis-à-vis du *T. gambiense*, après injection de "309 Fourneau." [**The Protective Properties of Blood Serum against** *T. gambiense* **after the Injection of "309 Fourneau."**]—*Bull. Soc. Path. Exot.* 1926. Nov. Vol. 19. No. 9. pp. 838–844.

Serum from cattle which have been injected with Fourneau 309 taken within 48 hours of the injection protects guineapigs in a dose of 1 cc. against infection with *T. gambiense*. In doses of 0·1 and 0·2 cc. the serum has no protective power, nor does it shorten the period of incubation, but it has a distinct effect in reducing its rate of progress. This is particularly the case when the serum is obtained less than 24 hours after the injection of the drug.

If the serum is not obtained until four days after injection it exercises no protective power.

Animals thus protected are not immune to inoculation with large doses of infective blood.

FOURNEAU (E.), TRÉFOUEL (M. et Mme.) & DE LESTRANGE-TRÉVISE. Les dérivés de l'acide phénylarsinique (arsenic pentavalent) dans le traitement des trypanosomiases. Relation entre l'action thérapeutique des acides arsiniques aromatiques et leur constitution. (Deuxième mémoire), [**The Relationship between the Therapeutic Action of the Aromatic Arsenic Acids and their Constitution in the Treatment of Trypanosomiasis.**]—*Ann. Inst. Pasteur.* 1926. Nov. Vol. 40. No. 11. pp. 933–951.

The authors find that the most active substances of the arsenical series are those in which there is substitution in both the ortho and-para positions, that in the para position being an amino function.

When a modification of a substance increases its therapeutic activity, the introduction of that modification into another and even more active substance does not of necessity have the same effect.

MACLEAN (G.). **History of an Outbreak of Rhodesian Sleeping Sickness in the Ufipa District of Tanganyika Territory with Short Notes on Cases and Treatment.**—*Ann. Trop. Med. & Parasit.* 1926. Dec. 17. Vol. 20. No. 4. pp. 329–339. With 1 text fig.

After dealing with the nature of the country and the spread of the disease the author gives a table showing its incidence. From this it appears that there were 62 positive cases out of a population of 563 during 13 months, between November 1924 and December 1925. The

diagnosis was based upon the comparatively acute course run by the disease—not usually longer than 6 months, and the finding of posterior nuclear forms in an infected rat.

The only species of tsetse met with was *G. morsitans*. Other biting flies were Tabanus, Haematopota, and in some places Chrysops.

Of 27 cases treated with " Bayer 205 " between November 1924 and March 1925, fourteen were still surviving a year later, and eight of these had remained in good health without further treatment. All the relapsed cases had been ill for 2 months or more before treatment was begun. A full treatment was four or more injections of 1·1 to 1·2 grammes for adults, and of the 12 who died only 6 had the full course.

Symptoms, with negative blood, were met with four months after treatment. In other cases parasites were found in the blood without symptoms nine months after treatment (but they may have been present earlier than this).

Albuminuria is a frequent sequel to treatment with " Bayer 205."

One woman treated with 3 g. of Tryparsamide weekly appeared to recover, but trypanosomes returned and another course of treatment was given.

In a second case trypanosomes disappeared after the first dose and reappeared after the eighth. Death from pneumonia occurred.

A third case died suddenly after the second injection.

A fourth case in which trypanosomes could be found with difficulty only had its blood swarming a week after a dose of 4 g. A complete course was not given in this case.

THOMSON (J. G.) & ROBERTSON (A.). **Variations in the Virulence and in the Morphology of Certain Laboratory Strains of** *Trypanosoma gambiense* **and** *Trypanosoma rhodesiense* **isolated from Human Cases.**—*Jl. Trop. Med. & Hyg.* 1926. Dec. 15. Vol. 29. No. 24. pp. 403–410. With 1 chart in text.

*Trypanosoma rhodesiense* is more readily established in rats than *T. gambiense*. *T. gambiense* varies in its behaviour as regards virulence in inoculated rats. It may become exalted or attenuated.

Strains of trypanosomes isolated at intervals from the same individual may vary in virulence for laboratory animals. Transmission by mechanical means tends to exaltation of virulence for the species of animal inoculated and passage through a host other than the usual one may modify the virulence in either direction.

Treatment by drugs may also vary the virulence of the parasites for experimental animals, again in either direction.

Mechanical transmission in series to one species of host tends to reduce the polymorphism of trypanosomes, but up to a certain point this can be restored by a change of host.

DUBOIS (A.) & BOUCKAERT (J. P.). L'hypoglycémie au cours des trypanosomiases expérimentales à *Trypanosoma brucei*. [**Hypoglycaemia in Experimental Trypanosomiasis.**]—*C.R. Soc. Biol.* 1927. Feb. 18. Vol. 96. No. 6. pp. 431–433.

The authors find that in animals infected with *T. brucei* there is a degree of hypoglycaemia which is chemically recognizable. Further research is required to elucidate its manner of production. They do not believe that the condition is in any way connected with the clinical symptoms of the infection.

REITANI (U.). Richerche sulla filtrabilità del trypanosoma marocanum. [**The Filtrability of** *Trypanosoma marocanum*]—*Ann. Med. Nav. e. Col.* 1926. Sept.–Oct. (32nd Year), Vol. II. No. 3–4. pp. 159–163.

Full details are not given, but the author finds that occasionally material containing *T. marocanum* is able to cause infection after passage under controls through a Berkefeld V filter.

CHADWICK (C. R.) & MCHATTIE (C.). **Notes on Cutaneous Leishmaniasis of Dogs in Iraq.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Mar. 9. Vol. 20. No. 7. pp. 422–432. With 3 plates.

The authors' investigations show that cutaneous leishmaniasis of the dog is of very common occurrence in Iraq.

In dealing with the factors which may influence the incidence of the disease the authors give some data regarding the nature of the soil, altitude, general sanitation, and seasons. The dogs show the sores during the cold months. Old sores may be found on dogs during the hot weather, but microscopic examination of these fails to reveal leishmania.

The period of incubation is from one to three months, and the period during which the lesion is unrecognizable as a sore also amounts to about a month. Sores become recognizable about the end of November, and it is therefore probable that infection takes place towards the end of August or later.

Although conditions are otherwise elsewhere, the observations of the authors indicate that human and canine leishmaniasis have about an equal prevalence in Iraq. Data are not yet sufficiently large to permit of the formation of any opinion regarding the relative prevalence of the canine disease in the towns and the open country. There appears to be no special age or breed susceptibility among dogs, and no case has been seen in a cat (a comparatively rare animal in Iraq).

In no case has evidence of infection of the internal organs or bone marrow been obtained.

The cutaneous lesions are generally found in the hairless parts of the dog, but they occur on various parts of the face with considerable frequency, and in many cases on one or both ears.

Irritation appears to be a constant symptom; dogs constantly rub or scratch the ulcers. The primary lesion is always followed by a crop of secondaries. These may be close together and coalesce, forming large ulcers.

In bad cases there may be marked emaciation, but since with care and a good diet this disappears, it would seem to be possible that loss of condition is partly, at least, due to lack of care and attention.

Two types of the disease are distinguished. In Type A there is a papular stage which lasts for two months or more, followed by a period of about equal duration when the lesions form ulcers. Healing requires about three months.

In Type B the papular stage lasts only for 3–4 weeks. The ulcers are small and more superficial and they readily respond to treatment.

It is not held that these are distinct conditions, but it is believed that the milder form represents a re-infection when the primary attack has not conferred complete immunity. Dogs, cats, horses, cattle, sheep, pigs, fowls and rabbits have been inoculated with material containing large numbers of parasites without success.

SHORTT (H. E.), CRAIGHEAD (A. C.), CHAND (K.) & SWAMINATH (C. S.). **The 'Resistant Non-flagellate Torpedo and O Bodies' of Row seen in Old Cultures of** *Leishmania donovani* **in their Relationship to the Production of Infections.**—*Indian Jl. Med. Res.* 1927. Jan. Vol. 14. No. 3. pp. 567–576.

The authors conclude that available evidence is against the probability of O bodies playing any part in producing infections.

SHORTT (H. E.) & SWAMINATH (C. S.). **The Mode of Formation and Morphology of the O Bodies of Row in Old Cultures of** *Leishmania donovani.*—*Indian Jl. Med. Res.* 1927. Jan. Vol. 14. No. 3. pp. 581–587. With 1 plate.

The authors believe that these bodies are end-products of degeneration and are not viable. The necessity of an insect transmitter renders the production of resistant forms unnecessary.

SHORTT (H. E.), BARRAUD (P. J.) & CRAIGHEAD (A. C.). **Note on the Infectivity of the Forms of** *Leishmania donovani* **found in** *Phlebotomus argentipes.*—*Indian Jl. Med. Res.* 1927. Jan. Vol. 14. No. 3. pp. 577–579.

The form of the parasite found in the fly is certainly infective, and the white mouse is proved to be suitable for experimental work.

NAPIER (L. Everard) & SMITH (R. O. A.). **The Development of** *Leishmania donovani* **in the Gut of the Sandfly** *Phlebotomus papatasii.*—*Indian Jl. Med. Res.* 1927. Jan. Vol. 14. No. 3. pp. 713–716.

In parallel tests with *P. argentipes* and *P. papatasii* it was found that while about 40 per cent. of the former became infected with leishmania, the percentage in the case of the latter was only 2.

ADLER (S.) & THEODOR (O.). **The Identity of** *Leishmania tropica* **Wright, 1903, and** *Herpetomonas papatasii* **Adler, 1925.**—*Ann. Trop. Med. & Parasit.* 1926. Dec. 17. Vol. 20. No. 4. pp. 355–364. With 2 plates.

The authors express the view that serological tests will oust all other methods of identifying species of Herpetomonas. Agglutination tests indicate that *Leishmania tropica* and *Herpetomonas papatasii* are identical.

ADLER (S.). **A Note on the Histopathology of a Case of Experimental Cutaneous Leishmaniasis.**—*Ann. Trop. Med. & Parasit.* 1926. Dec. 17. Vol. 20. No. 4. pp. 407–410. With 1 plate.

A human being was inoculated with herpetomonas from naturally infected *P. papatasii.* About 3½ months later a subcutaneous nodule developed. From this cultures were obtained on a medium containing

Agar 1, Locke's solution made up with 0·2 per cent. glucose 8, and fresh rabbit serum 1.

The lesion was punctured frequently during the next seven months. Cultures were positive from the latter examinations. Part of the lesion which measured 4·5 mm. in diameter was removed for microscopic examination. The summit of the nodule was 2·5 mm. below the surface of the skin. Hence feeding experiments with Phlebotomus failed.

The lesion was not encapsuled but consisted of a conglomeration of typical tubercles separated by strands of connective tissue, which were infiltrated with lymphocytes, plasma cells, and endothelial cells. The tubercles were at various stages of development. Some were recent and some showed fibrosis and caseation.

TURNBULL (D. O.). **Tropical Piroplasmosis in the Fort Jameson District of North-Eastern Rhodesia. With Plasma Bodies representing Developmental Stages of a Parasite Morphologically similar to** *Gonderia mutans.*—*Jl. Comp. Path. & Therap.* 1926. Dec. Vol. 39. No. 4. pp. 307–311.

The disease recorded by the author was originally diagnosed by him as East Coast Fever, on account of the symptoms, post mortem appearances, and the detection of plasma bodies. The disease, however, did not follow the course to be expected if this were actually the case, and subsequently the periodical detection of plasma bodies in the superficial lymphatic glands of animals in which recrudescences of the disease occurred as a result of unfavourable conditions of various kinds led to the exclusion of East Coast Fever.

The chronic form of the disease is generally seen in calves, but acute cases occur both in calves and in adults. The chronic form has not been observed in adults.

In calves the disease runs a course of some months, and periodic exacerbations occur. These cannot always be attributed to adverse circumstances, and in some cases appear to represent heavy re-infections. The disease so closely resembles East Coast Fever in all its manifestations, including the morphology of the causal organism, that it is surprising that the two are distinct entities. There is, however, a distinct difference in that after clinical recovery the animal remains a carrier. Lack of facilities has prevented the author from carrying out any tests from which conclusive results might be obtained.

Plasma bodies have been detected in a naturally infected calf at 18 days old, and the intracorpuscular parasite has been found in the blood at one month old.

The disease is of great economic importance both because of the mortality and the adverse effect upon calves suffering from a protracted infection.

In chronic cases in calves the parasite is generally very scantily present in the blood, and even in acute cases the blood invasion is never so heavy as in East Coast Fever. In cases where plasma bodies have been detectable the blood invasion is usually very slight. Morphologically the parasite is not recognizably different from *Theileria parva*. Plasma bodies have been detected in various internal organs, lymphatic glands, and in the circulating blood. They are usually more readily found in the glands than in the spleen. The usual corpuscular abnormalities of the blood associated with anaemia are discoverable.

SERGENT (Edm.), DONATIEN (A.), PARROT (L.), LESTOQUARD (F.) & PLANTUREUX (E.). Les piroplasmoses bovines dues aux *Babesiella*. Etude d'ensemble, avec description d'une espèce nouvelle : *B. major*, originaire de France. [**The Babesielloses of Bovines. General Survey, with a Description of a New Species** *B. major* **of French Origin.**]—*Arch. Inst. Pasteur d'Algérie.* 1926. June. Vol. 4. No. 2. pp. 318–339. With 1 plate and 5 text figs.

The new species was encountered in a calf obtained from Aubrac. This animal did not harbour any other endoglobular parasites and the pure infection has been passed in series through seven animals imported from France.

In only one case was there a rise of temperature after inoculation. The parasites appeared in the blood from 4 to 11 days after inoculation. In one case they were first seen on the 30th day, but it is said that this was probably due to a relapse, the first appearance having been overlooked. Parasites have been found in the blood for periods ranging from 1 to 11 days. The average number of invaded corpuscles is 9 per mille. The infection produces very little evidence of anaemia, and is very benign.

More than half the parasites are rounded, the remainder are for the most part elongated, but trefoil forms form about 4 per cent. of the total.

Trypanblue is without effect.

LESTOQUARD (F.). Les piroplasmoses du mouton et de la chèvre. [**The Piroplasmoses of the Sheep and Goat.**]—*Arch. Inst. Pasteur d'Algérie.* 1926. June. Vol. 4. No. 2. pp. 222–312. With 3 plates and 19 text figs.

This is a general account of the piroplasmoses and allied diseases of the sheep and goat.

The conditions caused by *Piroplasma ovis*, *Babesiella ovis*, *Gonderia ovis*, *Theileria ovis*, and *Anaplasma ovis* are all described at length.

The sheep and goat are susceptible to the same infections.

DONATIEN (A.). Le diagnostic des piroplasmoses. [**The Diagnosis of the Piroplasmoses.**]—*Arch. Inst. Pasteur d'Algérie.* 1926. June. Vol. 4. No. 2. pp. 161–221. With 3 plates and 15 text figs.

This paper is in reality a general survey of the piroplasmoses. In an introductory chapter the general characters of the infections and the methods of diagnosis are dealt with. In succeeding chapters the piroplasms and allied organisms occurring in the different species are dealt with at greater length. The avowed object of the paper is to stimulate the interest of field officers in the scientific aspects of the disease and foster co-operation between them and the laboratory workers. It is pointed out that laboratory investigations are essential for the establishment of specific diagnoses.

VAN SACEGHEM (R.). Propagation de *Theileria parva* par les tiques. [**The Spread of** *Theileria parva* **by means of Ticks.**]—*Bull. Agric. Congo Belge.* 1925. Sept.–Dec. Vol. 16. Nos. 3–4. pp. 582–591.

The author holds the opinion that recovery from East Coast Fever is not, as believed by many, a complete one. He believes that after

recovery there is a latent infection which ensures only a relative degree of immunity.

He finds that adult animals which have certainly passed through one attack as calves may again become infected when owing to scantiness of foodstuffs they lose condition.

In connexion with the question of the transmissibility of East Coast Fever the author states that he has frequently found small piroplasms exactly like *Theileria parva* in the blood of animals inoculated with blood containing that parasite. These are said to make their appearance a few days after the inoculation.

By the transfusion of three litres of blood containing *T. parva* in healthy animals the author states that he has been able to set up infection.

The first result of the transfusion is the appearance in the blood of parasites exactly like *Theileria parva* and in numbers which are proportional to the amount of blood used. No thermal reaction accompanies this appearance of parasites, which takes place about the 5th day. These forms disappear and about 18 days later they reappear and are accompanied by a marked thermal reaction. This reaction lasts about 5 days. With the virus used in these experiments the disease so produced is a benign one and does not always protect animals against natural infection.

This is held by the author to be the explanation of the results obtained by THEILER and others in connexion with East Coast Fever.

The author states that in view of his experiments he has serious reasons for thinking that *T. parva* and *T. mutans* are one and the same thing. It is admitted that the infection is not passed through the egg of infected ticks. The immature ticks must therefore, in an area like the Ruanda-Urundi district, where only calves contract the disease and where adults are immune, acquire the infection from calves. If that is so, how does it come about that the disease is enzootic there? If cattle from land more than 2,000 metres above sea level are brought down and placed in contact with cattle of the plains they become infected. This implies either that the ticks can acquire infection from the plains cattle and hand it on to the hill cattle, or that there is some other source of infection. Van Saceghem adduces further evidence in support of this view from BRUMPT's experiments. This author produced a disease with the characters of Theileriasis by inoculating cattle in France with blood from an apparently healthy African beast. Koch's bodies were found in these cases.

He believes, too, that *Theileria dispar* is also identical with *T. parva*, and states that this could be established with certainty by the inoculation of cattle which have passed through an attack of East Coast Fever with *T. dispar*.

DONATIEN (A.) & LESTOQUARD (F.). Sur l'emploi du trypanobleu dans le traitement des piroplasmoses des ruminants. [**Trypanblue in the Treatment of the Piroplasmoses of Ruminants.**]—*Bull. Soc. Path. Exot.* 1927. Jan. Vol. 20. No. 1. pp. 64–77. With 10 text figs.

The authors give details of cases of infection with *Babesia bigeminum* and *Babesia ovis* treated with trypanblue and find that it is very effective. They state that doses smaller than those generally used are sufficient. 0·1 to 0·2 g. injected intravenously suffices for the treatment of bovines.

Infections due to Babesiella, on the other hand, do not yield to treatment with trypanblue, and the authors consider that this resistance is a generic character.

YAKIMOFF (W. L.). Le trypanobleu agit-il sur les babésielloses? [**Is Trypanblue effective in Babesiella Infections?**]—*Bull. Soc. Path. Exot.* 1926. Nov. Vol. 19. No. 9. pp. 783–786.

The author gives statistics to show that in spite of the opinions expressed by others, trypanblue is of great service in the treatment of babesiella infections (*Babesiella bovis*). In Novgorod and Petrograd the use of the drug has reduced the mortality from between 30 and 60 per cent. to less than 8 per cent.

During the summer of 1926 the author immunized 124 animals by inoculating them and treating the resulting infection by intravenous injection of 2·25 g. of trypanblue.

The author believes that four different species of Babesiella occur in Russia, but up to the present information is available only regarding the action of trypanblue on *B. bovis*. He considers that the subgenus Babesiella should be subdivided into 2 groups.

Group 1. *Babesiella*, of which the type species is *B. bovis* Babes. The principal characteristic is a twin-pear forming an obtuse angle and situated at the margin of the corpuscle.

Group 2. *Françaiella*, which includes *B. argentina* Lignières, *B. berbera* Sergent, *B. major*. The characteristic form of this is also a twin-pear shaped form, but placed centrally in the corpuscle.

YAKIMOFF (W. L.), KÉDRINSKY (A. J.), AFANASIEFF (J. A.), IWANOFF (P. S.) & SWIRSSKY (S. A.). Le traitement de la babesiellose des bovidés par les sels d'argent. [**The Treatment of Bovine Babesiellosis by Silver Salts.**]—*Bull. Soc. Path. Exot.* 1926. Dec. Vol. 19. No. 10. pp. 887–890.

*Albargine.* This is a compound of dialysed gelatine with nitrate of silver, and contains about 15 per cent. of silver.

In very brief notes of six cases treated by an intravenous injection of 1 gramme of the salt the solvent is not mentioned. In four cases the exact result is not stated, but one is led to suppose that recovery took place. Two cases terminated fatally.

*Argoflavine.* This is a compound of trypaflavin with silver and contains 20 per cent. of silver. Two cases were treated, one with 1 g. intravenously and one with 1·5 g. No definite statement is made regarding the result, but apparently recovery took place in both cases as it is said that the urine lost its colour.

*Silvernovarsolan.* This drug is a silver salvarsan compound of Russian manufacture, containing 20 per cent. arsenic and 7 per cent. silver. Four cases are recorded. In one, recovery took place after an intravenous injection of 1 g. of the drug. In three cases ichthargan was resorted to after the silvernovarsolan and recovery took place in two of these.

BÉLAWINE (W. S.). Traitement de la piroplasmose à *Piroplasma bigeminum* au nord du Caucase. [**The Treatment of Piroplasmosis due to *B. bigeminum* in Northern Caucasus.**]—*Bull. Soc. Path. Exot.* 1926. Nov. Vol. 19. No. 9. pp. 786–791.

In southern Caucasus the mortality from infection with *B. bigeminum* is said to be from 90 to 92 per cent.

Experiments in treatment have been carried out with ichthargan arrhenal, trypanblue, and protargol.

One hundred and twenty cases were treated with ichthargan in doses of 1·0 to 1·5 g. dissolved in 100 cc. of water given intravenously. There were 14 deaths. 2·5 per cent. of the animals treated showed relapses 4 to 12 days later, and after a second treatment 80 per cent. of these died. [These figures appear to contain discrepancies.]

Three hundred and thirty three animals were treated by subcutaneous injections of arrhenal. The drug was used in 10 per cent. solution and the doses ranged from 2 to 4 grammes.

During the spring 33 animals were treated and the percentage mortality was 8·3. The remainder were treated during the summer and the percentage mortality was 24·8.

Among 200 animals injected intravenously with 1·0 to 1·5 g. of protargol dissolved in 100 cc. of water the mortality was 27·6 per cent. Two hundred animals were given intravenous injections of trypanblue in doses of 3 to 5 grammes. The strength of the solution is not stated. The percentage mortality was 18.

MACHADO (A.). La piroplasmose canine et son traitement. [**Canine Piroplasmosis and its Treatment.**]—*C.R. Soc. Biol.*. 1927. Feb. 25. Vol. 96. No. 7. p. 477.

Canine piroplasmosis is responsible for heavy losses in puppies in the neighbourhood of Rio de Janeiro. Trypanblue, while causing a disappearance of the parasites from the blood stream, does not effect a radical cure. Relapses which end fatally are likely to occur. Stovarsolate of soda does appear in some instances to effect a complete cure, but not in all.

Colloidal oxide of silver and argyrol have been quite ineffective.

Neosilversalvarsan in doses of 3 to 4 cg. per kg. has produced definite cures. The minimum effective dose has not been established, nor has the shortest interval elapsing between administration and the disappearance of the parasite from the blood been ascertained.

PURVIS (G. B.). **Immunity in East Coast Fever.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Mar. Vol. 20. No. 7. pp. 447–449.

The matter contained in this communication has been published elsewhere.

DESCHIENS (R.). Sur les protozoaires intestinaux des singes. [**The Intestinal Protozoa of Monkeys.**]—*Bull. Soc. Path. Exot.* 1927. Jan. Vol. 20. No. 1. pp. 19–23.

The author examined the faeces of 20 monkeys at the Pasteur Institute. Chimpanzees harboured *Entamoeba coli, E. dysenteriae. Endolimax kueneni,* Chilomastix and Trichomonas types of organisms. In Macacus organisms of the same types were found, except *E. dysenteriae* and Trichomonas. This genus however, harboured Giardia (in one out of nine examined).

Cercopithecus monkeys showed organisms resembling *E. coli, Endolimax kueneni* and Giardia.

DESCHIENS (R.). *Chilomastix* sp. observé chez le chimpanzé (*Anthropopithecus troglodytes*) et chez le macaque (*Macacus sinicus*). [**A Species of Chilomastix found in a Chimpanzee and a Macacus.**]—*Bull. Soc. Path. Exot.* 1926. Nov. Vol. 19. No. 9. pp. 794–798. With 2 text figs.

The two parasites are figured and described. That of the chimpanzee was transmissible to macacus, but material was wanting for the reverse test. The parasite is not morphologically distinguishable from *C. mesnili.*

RODHAIN (J.). Plasmodium de *Nycteris hispida* Schreber au Congo Belge. [**Plasmodium of** *Nycteris hispida* **in the Belgian Congo.**]—*Bull. Soc. Path. Exot.* 1926. Nov. Vol. 19. No. 9. pp. 780–781. With 1 text ffg.

The author has found the parasite described in this paper in the blood of one bat out of 59 examined. The organism is readily recognizable in fresh blood owing to the large size and black colour of the melanin granules, and owing to the enlargement of the invaded corpuscles. Only microgametocytes and macrogametocytes were found. The latter possess a more dense protoplasm and are richer in pigment. The parasites are rounded and non-vacuolated. The nucleus is usually excentrically placed, oval or irregular in outline. The pigment granules are elongated.

YAKIMOFF (W. L.), GALOUZO (I. G.), RASTAGAIEFF (E. F.), MIZKEWITSCH (W. J.) & TOLSTOFF (A. N.). Ueber die Darmkokzidiose der Schafe in Russland. [**Intestinal Coccidiosis of the Sheep in Russia.**]—*Berlin. Tierärzt. Woch.* 1926. Dec. 17. Vol. 42. No. 51. pp. 877–881.

The author records the occurrence of *E. Faurei* and *E. intricata* (Spiegl 1925) in sheep in Russia.

KRIJGSMAN (B. J.). Die Therapie der Kokzidiose. I. Teil: Die Kokzidiose der Kaninchen. [**The Treatment of Coccidiosis. Part I. Coccidiosis of the Rabbit.**]—*Centralbl. f. Bakt.* I. Abt. Orig. 1926. Dec. 7. Vol. 101. No. 1–3. pp. 108–126. With 1 plate and 7 text figs.

The author finds that atoxyl is of no value, but the use of creolin in conjunction with thorough prophylactic measures is valuable.

COOPER (H.) & GULATI (A.). **On the Occurrence of Isospora and Balantidium in Cattle.**—*Mem. Dept. Agric. in India.* Vet. Series. 1926. Nov. Vol. 3. Nos. 8–9. pp. 191–193.

Isospora were found in the faeces of 5 out of 181 cattle examined. The oocysts were round and sporoblast formation occurred within 24 hours.

Detailed examination could not be made at the time of collection of the samples of faeces as the authors were on tour.

Specimens of the faeces were mixed with formalin for preservation, but when these were examined later the parasite could not be found.

The Balantidium found is figured and described. The organisms ranged from 60–120$\mu$ by 44–90$\mu$. The organism appeared to differ

from *Balantidium coli* in that the greatest diameter was about the middle plane of the organism and not posterior to this. The macronucleus was ribbon-like with folded ends and not oval.

*Balantidium coli* var. *bovis* is suggested as the name.

CATANEI (A.). Sur la durée de l'immunité dans la spirochétose expérimentale des oiseaux. [**The Duration of Immunity in Experimental Avian Spirochaetosis.**]—*Arch. Inst. Pasteur d'Algérie.* 1926. Mar. Vol. 4. No. 1. pp. 53–55.

Experimental infection of birds with spirochaetes leaves a lasting immunity, the duration of which is not in proportion to the severity of the infection. This immunity does not appear to be reinforced by repetition of inoculation.

The immunity is effective against strains of spirochaetes from different sources.

SANARELLI (G.). Les spirochètes caecaux. [**The Spirochaetes of the Caecum.**]—*Ann. Inst. Pasteur.* 1927. Jan. Vol. 41. No. 1. pp. 1–44. With 2 plates.

The author deals at considerable length with the methods which may be employed for the cultivation of the organisms. Animal inoculations appear to indicate that the parasites produce effects mainly on account of the direct toxic power of their proteid.

In diseased conditions it is not impossible that spirochaetes which ordinarily occur in the lumen of the gut, and particularly in that of the large bowel, may gain access to the tissues.

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DOBELL (Clifford) & LAIDLAW (P. P.). **On the Cultivation of** *Entamoeba histolytica* **and some other Entozoic Amoebae.**—*Parasitology.* 1926. Sept. Vol. 18. No. 3. pp. 283–318.

PATTON (W. S.) & HINDLE (E.). **Reports from the Royal Society's Kala Azar Commission in China. No. 6. Notes on the Species of Sandflies (Genus** *Phlebotomus*) **of North China.**—*Proc. Roy. Soc.* 1926. Dec. 10. Series B. Vol. 100. No. B 705. pp. 405–412. With 7 text figs.

PINTO (César). Sur les genres de la sous-famille des *Eimeriinae*. (*Sporozoa. Eimeriomorpha*). [**The Genera of the Sub-family** *Eimeriinae* (*Sporozoa. Eimeriomorpha*).—*C.R. Soc. Biol.* 1927. Feb. 25. Vol. 96. No. 7. pp. 488–489.

RODHAIN (J.). *Plasmodium epomophori* n. sp., parasite commun des rousettes épaulières au Congo belge. [*Plasmodium epomophori* **n. sp., a Common Parasite of the Flying Fox in the Belgian Congo.**]—*Bull. Soc. Path. Exot.* 1926. Nov. Vol. 19. No. 9. pp. 828–838. With 2 text figs.

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## DISEASES DUE TO METAZOAN PARASITES.

ORTLEPP (R. J.). **On a Collection of Helminths from a South African Farm.**—*Jl. Helminth.* 1926. Aug. Vol. 4. No. 3. pp. 127–142. With 6 text figs.

The author enumerates the worms found in certain domesticated and wild animals.

He describes the male of *Gongylonema monnigi* BAYLIS, the account being based upon the examination of eleven specimens.

*Dibothriocephalus scenopi* n. sp. from the clawed toad is figured and described, and also *Diplodiscus doyeri* n. sp. from the same host.

BAER (J. G.). **Contributions to the Helminth-Fauna of South Africa. Mammalian Cestodes.**—*Union of South Africa. Dept. of Agric. 11th & 12th Reports of the Director of Veterinary Education and Research.* 1926. Sept. Part I. pp. 63–136. With 1 map and 43 figs.

The author gives a detailed description of a portion of a collection of parasites made by THEILER and presented to FUHRMANN. Twenty-two species were examined, of which nine were new. There were included two new genera and one new family. Of the nineteen hosts, fifteen appear to be new.

The new Family is *Lüheellidae*, with n.g. *Lüheella*, and n. sp. *L. pretoriensis*. *Fuhrmannella* n. g. (Fam. *Cyclophyllidea*), with n. sp. *F. transvaalensis*, and *P. acanthocirrosa* n. sp. of *Paranoplocephala*. *Inermicapsifer aberratus* n. sp. *Dipylidium fuhrmanni* n. sp. *Hymenolepis macroscelidarum* n. sp. *Hymenolepis* sp. *Taenia hyaenae* n. sp. *Taenia parva*, n. sp.

JOYEUX (Ch.) & BAER (J.-G.). Etude de quelques cestodes provenant des Colonies françaises d'Afrique et de Madagascar. [**Some Cestodes from the French African Colonies and from Madagascar.**]—*Ann. Parasit. Hum. et Comp.* 1927. Jan. Vol. 5. No. 1. pp. 27–36. With 8 text figs.

The authors refer to the following worms : *Cittotaenia africana* (n. sp.) obtained from a bird (probably a species of Bucerotidae), *Inermicapsifer arvicanthidis* (Kofend, 1917), *Thysanotaenia lemuris* (Beddard, 1911), *Raillietina* (*Paroniella*) *blanchardi* (Parona, 1897), *Raillietina* (*Paroniella*) *retractilis* (Stiles, 1895), *Raillietina celebensis* (Janicki, 1902), *Hymenolepis diminuta* (Rud., 1819), Hymenolepis sp. found in *Thryonomys swinderenianus*, Icterotaenia sp. found in a rat. *Catenotaenia lobata* (Baer, 1925) and *Cysticercus fasciolaris* (Rud., 1808).

JOYEUX (Ch.). Recherches sur le cycle évolutif d'*Hymenolepis erinacei* (Gmelin, 1789). [**The Cycle of Development of** *Hymenolepis erinacei.*]—*Ann. Parasit. Hum. et Comp.* 1927. Jan. Vol. 5. No. 1. pp. 20–26.

In the present state of knowledge it must be concluded that *Hymenolepis erinacei* develops directly. The armed cysticercoid inhabits the intestinal villi of the hedgehog, and the adults are unarmed.

HILES (I.). **Serological Studies on Hydatid.**—*Jl. Helminth.* 1926. Nov. Vol. 4. Nos. 4–5. pp. 143–178.

The author finds that an alcoholic extract of scolices is a more potent antigen than hydatid fluids. Saline in the alcohol used for extraction appeared to decrease the potency of the antigen.

MAROTEL (G.). Une nouvelle maladie parasitaire : La monostomidose cutanée du dindon. [**A New Parasitic Disease. Cutaneous Monostomidosis of the Turkey.**]—*Rev. Vét.* 1926. Dec. Vol. 78. No. 12. pp. 725–736. With 2 text-figs.

The lesions took the form of pea-like cutaneous nodules from 4 to 6 mm. in diameter. The majority showed a central orifice covered

with a brownish crust. They occurred over the abdomen and particularly around the cloaca. In some cases they were aggregated together to form larger masses. Each lesion on section was found to contain two worms. These were lentil shaped and measured 3–5 mm. in diameter. The bodies were greyish and gelatinous looking, but a yellow and a brown U-shaped marking indicated the disposition of some of the internal organs. There was a single sucker anteriorly, which contained the mouth. The intestinal sacs, which were of relatively enormous size, were unbranched. These were the yellow bodies visible with the naked eye.

There were two piriform testes and a branched ovary, two lateral vitelline glands, a large uterus showing two or three convolutions, and a large excretory vesicle. The musculocutaneous system was very poorly developed.

Nothing is known regarding the development and method of infestation.

FAIRLEY (N. Hamilton) & JASUDASIN (F.). **The Experimental Transmission of *S. spindalis* to the Indian Water Buffalo.**—*Indian Jl. Med. Res.* 1927. Jan. Vol. 14. No. 3. pp. 701–706. With 1 plate & 1 graph.

Two buffaloes were exposed to the action of nearly 60,000 cercaria each. Post mortem examination was carried out on the 81st and 94th days, when living schistosomes were found in the portal and mesenteric veins and ova containing living miracidia were found in both large and small intestines. They were also found in the liver. Bilharzial pseudo-tubercles were found in the liver. The periportal zones showed leucocytic infiltrations and there was thrombosis of the periportal veins. Ova were found in the clots.

The Bordet-Gengou antibody response was later in developing and less marked than in goats. This is attributed to the disparity in dose administered to the heavier animals.

The author believes that the water buffalo will be found to constitute the chief definitive host of *S. spindalis*.

ZUNKER (M.), BACH (V.) & JORDAN (W.). T.53 Merck, ein neues Leberegelheilmittel für Rinder. [**T.53 Merck, a New Drug for the Treatment of Fluke Disease in Cattle.**]—*Berlin. Tierärzt. Woch.* 1927. Feb. 25. Vol. 43. No. 8. pp. 121–123.

This potent drug is injected intraperitoneally in doses ranging from 30–50 cc. Postmortem examination of 658 affected animals has, it is claimed, established the value of the treatment.

GULATI (A.). **On the Occurrence of a Lung Fluke *Paragonimus edwardsi* n. sp. in a Palm Civet (*Paradoxurus grayi*) in Kumaon Hills.**—*Mem. Dept. Agric. India. Vet. Ser.* 1926. Nov. Vol. 3. Nos. 8–9. pp. 187–190.

The author figures and describes the parasite found in the lungs of *Paradoxurus grayi*. Eight cysts were present and from each of these a pair of parasites was obtained.

BHALERAO (G. D.). **The Trematodes of** *Corvus insolens* **(a Burmese House-Crow), with a Description of Four New Species.**—*Parasitology.* 1926. Dec. Vol. 18. No. 4. pp. 387–398. With 7 figs.

The new species described are *Echinochasmus corvus, Stephanoprora reynoldi, Phaneropsolus insolens,* and *Lyperosomum kakea.*

KHALIL (M.). Une nouvelle espèce de *Parabronema* du rhinocéros (*Parabronema rhinocerotis* n. sp.). [**A New Species of Parabronema of the Rhinoceros** (*Parabronema rhinocerotis* **n. sp.**).]—*Ann. Parasit. Hum. et Comp.* 1927. Jan. Vol. 5. No. 1. pp. 37–40. With 4 text figs.

The parasite is figured and described, and a table of comparative measurements is given.

GULATI (A.). **Experiments on the Treatment of Hookworm Infections in Dogs.**—*Mem. Dept. Agric. India. Vet. Series.* Vol. 3. No. 7. 1926. Nov. pp. 167–184.

The paper records a series of observations regarding the prevalence and intensity of infection of hookworm disease at Muktesar (U.P., India), and gives the results of experiments in connexion with the treatment; 96·2 per cent. of 104 dogs were found to harbour the parasite. About half of those infested had 50 or less worms. About a quarter had between 50 and 100, and the remainder from 100 to 500. All the worms belonged to the species *A. caninum* and *A. braziliense.*

The drugs used were oil of chenopodium, chloroform, carbon tetrachloride,and tetrachlorethylene.

Mixtures of oil of chenopodium with chloroform and carbon tetrachloride, carbon tetrachloride alone, and tetrachlorethylene were not effective.

VELU & BALOZET. Sur une maladie méconnue : La Bunostomiase ovine. [**A Little Known Disease : Ovine Bunostomiasis.**]—*Rec. Méd. Vét.* 1926. Dec. Vol. 102. No. 22. pp. 434–437.

The authors describe outbreaks of disease with considerable losses in flocks of sheep in which it appeared to be certain that infestation with *B. trigonocephalum* was responsible. Both adults and lambs were attacked, but more particularly the latter. They state that they have had the opportunity of seeing an outbreak of the disease under conditions which were almost experimental.

The flock, which comprised some 600 head, had been treated with arsenic for two years. This, it is stated, certainly frees the stomach and intestine of other parasites. [This is open to question.—Ed.].

In adults the disease can scarcely be identified with certainty by the symptoms. At post mortem examination there are found oedema of the intestinal wall, petechiae, and erosion, which is sometimes extensive, of the mucous membrane.

In lambs the symptoms of verminous anaemia are not so pronounced, but weakness of the legs, with knuckling over at the fetlocks, increasing paralysis, and finally collapse into a semi-comatose condition are the symptoms noted.

The course of the disease may be so rapid that there may be no great degree of wasting, but the animals are literally bled white. Lesions in the intestine are not conspicuous and worms may not be very numerous.

SCHWARTZ (B.). **A New Parasitic Nematode from the Stomach of an Unknown Member of the Cervidae.**—*Jl. Parasit.* 1926 Sept. Vol. 13. No. 1. pp. 25–28.

The author figures and describes a parasite from the stomach of a deer (?) from Tonkin. The parasite is named *Ostertagia houdemeri*, n. sp.

GENDRE (E.). Sur un nématode nouveau, parasite des poissons. [**A New Nematode of Fish.**]—*Bull. Soc. Path. Exot.* 1926. Nov. Vol. 19. No. 9. pp. 798–802. With 7 text figs.

The parasite was found in an undetermined fish caught at the confluence of the Kouloufing and the Gambia. Certain of its characters resemble those of the Subuluridae, Kathlaniidae and Cucullanidae, but the mouth parts and oesophagus are quite distinct in character from any of these. The discovery of neighbouring forms must be awaited before the parasite can be placed definitely. The name *Quimperia* n. g. *lanceolata* n. sp., is suggested.

Reference must be made to the original for details.

CRAWFORD (M.). **Development of Habronema Larvae in Drosophilid Flies.**—*Jl. Comp. Path. & Therap.* 1926. Dec. Vol. 39. No. 4. pp. 321–323. With 1 text fig.

In the stomach of an arab stallion there was found a large habronemic tumour containing great numbers of *H. megastomum*. There was also extensive ulceration caused by a heavy infestation with *H. muscae*.

A tray of stomach contents was kept exposed for five days and then covered with a glass beaker and kept at room temperature for a week. A number of flies were found in the beaker and these were identified by HUTSON as drosophilid flies. One of these was crushed in saline under a coverglass and nine larvae were found. From their position in the specimen it appeared to be probable that they had emerged from the crushed thorax. None were seen near the proboscis. They did not move about the field. In half an hour all movement stopped. Of twenty flies examined, two were found infected; one contained nine larvae, and the other, one.

On the eighth day, further flies hatched out, but these were not examined, and on the following day there were two larger flies, apparently belonging to the same genus, but of a different species. In one of these two larvae were found, and in one of nine of the smaller species four larvae were detected.

It is said that the precautions taken were sufficient to prevent contamination of the stomach contents with any extraneous material, and it is therefore concluded that the larvae must have been those of either *H. muscae* or *H. megastomum*. No *Musca domestica* or *Stomoxys calcitrans* hatched out.

The larvae were 400 to 460$\mu$ long by 8 to 12$\mu$ broad. The caudal extremity was sharply pointed, the body tapered slightly towards the cephalic extremity and the head was slightly expanded.

KEILIN (D.). **The Problem of the Origin of Nematodes.**—*Parasitology.* 1926. Dec. Vol. 18. No. 4. pp. 370–374.

In this paper the author discusses the relationship between the free-living and the parasitic nematodes and that between the nematodes and the arthropods.

The author expresses the view that free-living nematodes are derived from parasitic forms by secondary re-adaptation to the free mode of life. Their original change from free to parasitic mode was accompanied by morphological adaptation, but (on the basis of DOLLO's law of the irreversibility of evolution) they have not re-acquired their original characters on reverting to a free mode of living.

The author does not accept the view of the arthropod origin of nematodes.

MONTGOMERIE (R. F.). **Some Miscellaneous Observations on the Anthelmintic Value of Carbon Tetrachloride in Sheep.**— *Vet. Jl.* 1926. Dec. Vol. 82. No. 12. pp. 583–591.

The author gives details of experiments, field trials, and flock treatments with carbon tetrachloride in conjunction with magnesium sulphate. In the first experiment a Welsh mountain ewe was given 1 cc. of carbon tetrachloride in a soft gelatin capsule, and immediately afterwards as much dry magnesium sulphate as would fill a No. 12 capsule (hard gelatin). [There is no indication as to what weight of magnesium sulphate was given.—Ed.] Liver fluke eggs practically disappeared from the faeces, but the " count of nematode eggs, while somewhat reduced, remained considerable."

Post-mortem examination was made on the 12th day. Thirty-seven *Haemonchus contortus* and 242 comprising *Chabertia ovina, Oesophagostomum venulosum* and *Monodontus trigonocephalus* were recovered from the large intestine.

In the second experiment the dose of carbon tetrachloride was increased to 5 cc., the dose of magnesium sulphate remaining the same. At the post-mortem examination 20 specimens of *O. venulosum* and 2 of *Chabertia ovina* were found. In the course of the 12 days the nematode egg content had fallen from 866 per gramme to 22.

In the first field trials eight Welsh mountain yearlings were put under treatment. The post-mortem examination of a number of the flock beforehand showed the presence of *H. contortus,* apparently pure, in the abomasum. *T. ovis* and *O. venulosum* were present in the large intestine. According to a tabular statement each animal showed a steady fall in the egg content of the faeces during a period of 36 days after treatment ; only one of the animals was subjected to post-mortem examination, and in it 30 specimens of *H. contortus,* 31 *T. ovis,* and 11 *O. venulosum* were found.

In the second trial 4 similar sheep were used. The same dose of carbon tetrachloride was given but no magnesium sulphate. Again there was a steady drop in the egg content over a period of about a month. No post-mortem examinations were made.

In the third trial two Shropshire ewes were used. These had the same treatment as those in the second trial. The results were the same. No post-mortem examinations were made.

In all cases clinical improvement associated with the slow fall of the egg content is taken as indicating efficient treatment.

In the flock treatments 150 young mountain ewes were given 5 cc. of carbon tetrachloride and dry magnesium sulphate, and 222 wethers were given the carbon tetrachloride alone. Rapid improvement in condition is reported.

WALTON (C. L.) & WRIGHT (W. Rees). **Hydrogen-ion Concentration and the Distribution of** *Limnaea truncatula* **and** *L. peregra*, **with a Note bearing on Mosquitoes.**—*Parasitology*. 1926. Dec. Vol. 18. No. 4. pp. 363–367.

The authors are of the opinion that the pH of the medium is not a matter of vital importance. There is, however, a differential distribution, and this it is thought may be connected with morphological differences between the two species. In *L. truncatula* the foot is small and the shell a narrow spire. In *L. peregra* the foot and shell are relatively broader. The latter can travel over soft mud in which the former would sink. *L. truncatula* will always leave a soft substance for a harder one.

Hydrogen-ion concentration also appears to be of little or no importance in mosquito development.

BARAH (M.). L'huile de Chaulmoogra dans le traitement de la Démodécie. [**Chaulmoogra Oil in the Treatment of Demodectic Mange.**]—*Rec. Méd. Vét.* 1926. Nov. Vol. 102. No. 19. pp. 666–669.

The author has had good results in some fifty cases with a dressing having the following composition :—

| | |
|---|---|
| Carbolic Acid ... ... ... ... | 10 g. |
| Ether ... ... ... ... ... | 250 g. |
| Chaulmoogra Oil ... ... ... ... | 750 cc. |

During treatment the animals are not washed, as it is held that this tends to spread the infection.

Daily applications are made without friction for five or six days, and then every two or three days until the hair begins to grow again. Once a week the treated areas are cleaned with camphorated alcohol.

Three to six weeks are required for a cure, depending upon the extent of the disease. No relapses have occurred.

The disadvantages of the method are : (1) the disagreeable odour of the oil ; (2) the irritant effect of the oil. Friction and excessive amounts of dressing must be avoided ; (3) licking the dressing may result in vomition. It is therefore difficult to dress lesions satisfactorily in the neighbourhood of the mouth.

VERNEY (F. A.). **Sheep and Goat Scab in Basutoland.**—*Jl. Comp. Path. & Therap.* 1926. Dec. Vol. 39. No. 4. pp. 301–306.

The author describes the plan put into force for the control of these diseases.

As it was impracticable to make a charge for dipping, a tax was placed on all wool exported to provide the funds. Tanks have been erected at approximately 12 miles apart. First and second dippings are marked by different coloured brands and all animals in the area covered by a tank are dipped simultaneously. In the general plan of campaign it was decided to begin at the confines of the country and work

inwards. This was done first to reduce the risk to clean flocks over the border and secondly because the scheme was easier of application on the lower lying land. Experience would therefore be gained more readily. No sheep are allowed without permit to enter an area that has been cleaned, and such sheep have to be dipped prior to entry.

Extreme care must be exercised in using absolutely reliable dips, and in mixing thoroughly. The losses have amounted to about ·002 per cent. (over 2,000,000 sheep having been dipped in 1924–25), and 75 per cent. of the losses occurred at the second dipping among the sheep first dipped when a new tank-full had been mixed. Goats stand dipping better than sheep, and they are therefore dipped before them.

The author draws attention to the following points in connexion with the diagnosis of the disease. In advanced cases the parasite favours the orbital fossa and the ear, and recurrences are probably due to the escape of these situations when hand dressing is done. In dipping each animal has its head immersed four times, but this is not sufficient to ensure full effect of the dip. The perinaeum is another favourite place, and here there may be little disturbance of the skin. No flock should be passed until every ram has been caught and carefully examined in the perinaeum, testicles, penis and brisket. Bastard sheep appear to be very insensitive to the parasite. Infection in these animals may be overlooked.

The ravages of scab are largely dependent upon the season and amount of grass available.

Badly infected flocks are dipped three times during a period of 19–20 days, and no attempt is made to deal with infected kraals. The infected kraal is now known not to be the source of danger it was once thought to be.

There is evidence that severe outbreaks of goat mange may result from infection from horses, the type being sarcoptic. Ordinary dipping is of no value for this. But treating with horse-mange dressing was effective in two applications.

MINISTRY OF AGRICULTURE AND FISHERIES. **Report of the Departmental Committee, 1926, on Warble-Fly Pest.**—pp. 1–48. London: H.M. Stationery Office.

In the eradication of the fly is a two-fold problem, viz., to prevent egg laying and to destroy the ripe maggots. So far no satisfactory method has been devised for the former of these. In regard to the latter, a great deal can be done by the application of suitable dressings every two or three weeks between February and June. It is essential that the dressing penetrates the breathing hole in the skin and gains access to the parasite.

Tobacco powder and lime, a mixture of 3 lb. of tobacco powder with 2 lb. of lime per gallon, was found to kill 90 per cent. of the warbles. It was also found that a dressing containing 4 lb. of tobacco powder, 1 lb. of lime in 1 gallon of water was effective. This mixture must be used fresh, as it deteriorates. Dressings containing derris root powder were used, but there is difficulty in obtaining a standard product. A mixture of nicotine sulphate and lime can be recommended. The formula for this is: Nicotine sulphate 2 fluid ounces, Calcium hydrate 1 pound, and water 1 gallon. This must be prepared just prior to use, as it does not retain its strength.

An ointment composed of 1 part iodoform and 5 parts vaseline has been used with success by others, but it was not tested by the Committee.

FABER, (Harald). **Exterminating the Warble-Fly in Denmark.**—*Jl. Ministry of Agriculture.* 1927. Jan. Vol. 33. No. 10. pp. 905–907.

Extermination is more likely to be achieved in Denmark than in some other countries, because on account of the severe winters cattle are generally stall fed for about 7 months, and are taken out about the end of April. Inspection before they leave the byres is therefore more or less readily carried out.

A number of laws have been passed compelling the removal of warbles before the animals are turned out. The percentage of hides damaged by warbles has as a result of this campaign fallen from 20 per cent. in 1922 to 4 per cent. in 1925.

IMES (M.). **Summary of Results of Field Trials by the U.S. Bureau of Animal Industry on Ox-warble Control.**—*Jl. Parasit.* 1926. Sept. Vol. 13. No. 1. pp. 42–46.

The infestation by flies may be reduced but not eradicated by the use of arsenical or other cattle dips. Wading vats are useful and economical for the application of repellents to the legs of cattle. So-called " processed crude petroleum " or similar oils and 2 per cent. solution of coal-tar-creosote dip are the most effective medicaments.

MASON (G. B.). **A Method for Destroying Fly Larvae developing in Stable Manure.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1927. Mar. Vol. 20. No. 7. pp. 433–435. With 1 plate.

Conditions in Bermuda favour the breeding of flies in manure and other refuse throughout the year. Adult flies hatch from the egg in twelve days. They are known to cover distances up to thirteen miles, and can travel six miles in twenty-four hours. Their duration of life is eight to ten weeks.

A concrete platform 6 ft. square is surrounded by walls on three sides and divided by a central partition. On the fourth side there is a gutter towards which the platform slopes. All walls have an overhanging edge to prevent the larvae crawling away.

In one partition the manure and litter, after removal of excess of straw (which is raked off and burnt), are stacked daily. It is essential that it be beaten tightly down with a spade, and in dry weather watered. There must be left a space of one foot between the edge of the heap and the gutter.

Each day the surface layer which has not become heated is lifted off and turned into the centre, which is opened for the purpose. One compartment is used until the heap reaches to within 6 inches of the top of the walls. The heap is then left for ten days, the surface drier layers being turned into the centre of the heap, and previously heated manure is beaten down on the top. A covering of earth is put over the top. This is left for ten days, while the other half of the platform is stacked. The manure from the compartment first filled is removed for use. A few larvae which may escape destruction by heating cannot escape

over the projecting ledges as the top of the walls and those crossing the bare space of floor, fall into the gutter in which some disinfectant is placed. This not only kills them, but prevents the breeding of mosquitoes in the water. If no roof is provided for the protection of the heaps from rain a gutter containing desinfectant must be run all round the platform on the outer side of the wall.

Larvae can climb the walls when wet and escape.

URIBE (C.). **On the Biology and Life History of** *Rhodnius prolixus* **Stahl.**—*Jl. Parasit.* 1926. Dec. Vol. 13. No. 2. pp. 129–136. With 1 plate.

Sixty-two per cent. of 553 specimens examined were found to harbour stages of *Trypanosoma cruzi*.

The faeces of fully fed insects were found to contain infective forms of the parasite and starved larvae were observed to feed on such faeces.

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CAMERON (T. W. M.). **On the Morphology of the Free Living Larvae of** *Chabertia ovina*.—*Jl. Helminth.* 1926. Nov. Vol. 4. No. 4-5. pp. 185–190. With 10 text figs.

CONNAL (A.). **The Rodents of Lagos and their Ectoparasites with Reference to Plague.**—*Ann. Trop. Med. & Parasit.* 1926. Dec. 17 Vol. 20. No. 4. pp. 341–352. With 1 chart and 1 map.

COUTELEN (F.). Essai de culture *in vitro* de scolex et d'hydatides échinococciques (*Echinococcus granulosus*). [**An Attempt to Cultivate in vitro Scolex and Echinococcus Hydatids.**]—*Ann. Parasit. Hum. et Comp.* 1927. Jan. Vol. 5. No. 1. pp. 1–19. With 2 figs.

FAUST (E. C.) & NISHIGORI (M.). **The Life Cycles of Two New Species of Heterophyidae, Parasitic in Mammals and Birds.**—*Jl. Parasit.* 1926. Dec. Vol. 13. No. 2. pp. 91–128. With 4 plates and 4 text figs.

JOBLING (B.). **A Comparative Study of the Structure of the Head and Mouth Parts in the Hippoboscidae** (*Diptera pupipara*).—*Parasitology.* 1926. Sept. Vol. 18. No. 3. pp. 319–349. With 5 plates and 4 text figs.

ROSS (I. Clunies). **The Metazoan Parasites of Poultry in Australia.**—*Jl. Austral. Vet. Assoc.* 1926. Dec. Vol. 2. No. 4. pp. 129–139.

SCHWETZ. La limite actuelle de la *Gl. morsitans* autour d'Elisabethville (Katanga) avec quelques considérations sur les causes du recul progressif de cette mouche. [**The Actual Limit of** *G. morsitans* **in the Neighbourhood of Elizabethville with some Considerations regarding the Causes of the Progressive Retreat of this Fly.**]—*Bull. Soc. Path. Exot.* 1927. Jan. Vol. 20. No. 1. pp. 78–87.

YOUNG (T. C. McCombie). **Some Observations on Sandflies in Bombay City.**—*Indian Jl. Med. Res.* 1927. Jan. Vol. 14. No. 3. pp. 679–683.

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## BACTERIAL DISEASES.

GILTNER (Ward). **Vaccination against** *Brucella abortus* **with Non-Virulent Cultures.**—*Jl. Comp. Path. & Therap.* 1926. Dec. Vol. 39. No. 4. pp. 318–320.

The author surveys very briefly the subject of the respective values of live and dead vaccines. He points out that while dead vaccines and bacterins are discredited great risk attaches to the use of living vaccines which are pathogenic.

HUDDLESON, working with the author, encountered a strain of *Br. abortus* which was non-pathogenic for guineapigs. It was isolated from the placenta of an aborting cow in the experimental herd. It was capable of producing good antibody reactions in guineapigs and also protected

them against pathogenic strains. Experiments with cattle showed that it could be used for them also. At first the live vaccine was preceded by a dead one, but this was subsequently omitted.

Over a thousand cattle have been treated, and the results indicate that the vaccine is safe and effective. Pregnant and non-pregnant cows may be inoculated. It is emphatically stated that the vaccine is not to be used upon infected animals, but no reason for this is given.

In guineapigs the duration of immunity is two gestation periods. It has not been determined how frequently cattle should be inoculated.

The paper contains no details of the preparation of the vaccine, but it is stated that the viability of the organism is readily affected by the reaction of the medium in which it is suspended, and that this may be affected by the quality of the glass used in the container.

Ascoli (M.) & Sanfilippo (E.). **On the Immunization of the Goat against Undulant Fever.**—*Jl, Trop. Med. & Hyg.* 1927. Jan. 15. Vol. 30. No. 2. pp. 19–21.

The authors find that goats can be immunized to an as yet undetermined extent by inoculation with cultures of *B. melitensis* killed either by heating to 60° C. for two hours or by a 1 per cent. solution of gold-chloride. The latter vaccine is better tolerated, it caused less reaction, and produced a higher agglutinin concentration.

Only two animals have been treated.

Messieri (A.). Studio sperimentale sull'infezione da germi del genere "*Brucella*" nella specie canina. [**The Experimental Study of the Infection of Dogs with the Genus** *Brucella*.]—*La Nuova Veterin.* 1926. Dec. 15. Vol. 4. No. 12. pp. 317–325.

The author has carried out comparative tests with *M. melitensis* of caprine and of human origin and with *B. abortus* Bang.

He finds that dogs offer a high degree of resistance to infection, and that to achieve infection large doses of organisms are requisite.

The organisms do not persist for long in the bodies of dogs so infected.

The dog does not furnish any differential criterion between the types of organisms used.

Béquet (M.). Sur les conditions de l'agglutinabilité des microbes et du phénomène de l'agglutination. (Étude faite sur *Br. melitensis* et *Br. abortus*.) [**The Conditions controlling the Agglutinability of Microbes and the Phenomenon of Agglutination using** *Br. melitensis* **and** *Br. abortus*.]—*Ann. Inst. Pasteur.* Jan. 1927. Vol. 41. No. 1. pp. 49–58.

The phenomenon of agglutination depends upon the flocculation of various bacterial substances which are in part absorbed by the bacterial bodies and in part diffused in the liquid. It occurs under conditions which vary with the concentration of these substances, the temperature, and the ionization of the suspending liquid. These conditions are governed by the general laws applying to the stability of colloidal solutions. With regard to *Br. melitensis* there is evidence to show that: (1) There is a substance which is flocculable by heat in normal saline, by acids and by non-specific sera, and from which one can free the suspension by adsorption with animal charcoal. This substance is

according to BURNET a superficial production of the microbe; (2) a substance which is flocculable by bases even after the action of animal charcoal; (3) a purely bacterial substance belonging to the genus Brucella which is flocculable by specific sera, which passes in part into the liquid to maintain equilibrium whenever a suspension of the organism is prepared. The flocculation of this substance is hindered by a sufficient concentration of the substance flocculable by heat.

ZELLER. Zur Schafrauschbrandfrage. [**Black-leg in Sheep.**]—*Deut. Tierärzt. Woch.* 1926. Dec. 4. Vol. 34. No. 49. pp. 847–849.

The author, as a result of his investigations, concludes that the organisms responsible for black-leg in cattle and sheep are closely allied. Morphologically, culturally, and in their effects upon guinea-pigs, cattle, and sheep they are alike. Nevertheless, they differ from each other in certain biological characters.

In immunizing cattle and sheep the appropriate strains should be used.

M'EWEN (A. D.). **Quarter-Evil and Braxy: Studies regarding Immunity.** —*Jl. Comp. Path. & Therap.* 1926. Dec. Vol. 39. No. 4. pp. 253–283.

This paper is divided into two parts, dealing with the two types of nfection. In Part I the cultural characters of *B. chauvoei*, including fermentation reactions, agglutination tests, and various methods of conferring immunity, are described. In connexion with the cultivation of *B. chauvoei* the author describes a new and very valuable method of obtaining cultures which are quite free from the tissue débris always found in Tarozzi medium. Apart from this, however, the method renders possible the preparation of standardized suspensions.

The essence of the method is to place the requisite amount of animal tissue in a semi-permeable container which is immersed in the broth. The containers used are "Whatman's Diffusion Shells" of artificial parchment, and the technique of the preparation of the medium is as follows: Broth, containing sugars as required, is placed in conical flasks. The diffusion shells are soaked in water which is momentarily brought to the boil. The water is poured off, and minced liver to the extent of 1 gramme per cc. of broth placed in the shells along with one or two glass beads as sinkers. The shells are lowered into the broth, and broth is added (by means of a pipette) to bring the levels inside and out alike. Flasks thus prepared may be used without having recourse to the anaerobe jar by the addition of a layer of liquid paraffin. Sterilization is effected by autoclaving.

*B. chauvoei* gives evidence of growth in about 8 hours, if suitable sugar be present, and growth reaches its maximum in 16 hours. In such cultures cylindrical bacillary forms predominate. Swollen forms are rare and spores may not be found even after prolonged incubation.

Growth appeared to be most abundant in media at pH. 7·8 or 8.

The values of different sugars in promoting growth was determined by Gates' platinum loop density tests. Saccharose was found to be the best, and it was used in the place of glucose in routine work. Agglutination tests carried out with nine strains of *B. chauvoei* showed that they all belonged to one type.

Filtrates of *B. chauvoei* are capable of conferring a considerable degree of immunity upon animals, and they are non-toxic. A higher degree of immunity can, however, be conferred by the use of vaccines composed of *B. chauvoei* which have been killed by formalin. Twenty-hour cultures were used and these were sterilized by the addition of ·5 per cent. formalin. In connexion with the immunizing properties of germ-free filtrates it was found that 24-hour cultures were as valuable as older growths.

In contradistinction to the results obtained with *B. chauvoei*, it was found that non-toxic filtrates of *V. septique* conferred no immunity. Toxin was rendered inert by exposure to 65° C. for half an hour. Toxic filtrates on the other hand may, in relatively large doses, produce a considerable degree of immunity. For this reason, filtrates of cultures of *V. septique* are of less value than those of *B. chauvoei*. *V. septique* or its spores can be used as a safe and reliable vaccine when it has been killed by formolization. Small doses only are sufficient to confer immunity.

CLAVERIE (J.). Au sujet du charbon bactéridien et de la vaccination par la voie intradermique en Guinée française. [**Anthrax and Intradermic Vaccination in French Guinea.**]—*Bull. Soc. Path. Exot.* 1926. Nov. Vol. 19. No. 9. pp. 864–870.

Anthrax is known in Upper, Middle, and Lower Guinea, but there are no statistics regarding the frequency of occurrence. The author estimates that out of a cattle population of about 750,000, there are at least 750 deaths a year. It is exceptional to find any local lesion indicating the portal of entry of the virus in animals dead of anthrax. The disease occurs most frequently at the end of the dry season when grazing and water are scanty, and the cattle eat what grass there is right down to the roots and in so doing ingest a considerable amount of earth. There are some indications that overwork of draught oxen is a factor in the causation of anthrax.

In carrying out intradermal vaccinations it was found that the 2nd vaccine of the Pasteur Institute could safely be used in doses of $\frac{1}{4}$ and $\frac{1}{8}$ cc. for bovines and sheep, but that these doses were likely to be followed by a mortality of 50 per cent. in goats.

HRUSKA (Ch.). Recherches expérimentales sur le charbon. Production d'un sérum anticharbonneux actif par injections simultanées de liquide d'oedème et de bactéridies charbonneuses animalisées. [**Experimental Investigations regarding Anthrax. The Production of Anti-Anthrax Serum by the Simultaneous Injection of Oedematous Liquid and "Animalized" Anthrax Bacilli.**]—*Ann. Inst. Pasteur.* 1927. Jan. Vol. 41. No. 1. pp. 72–81. With 2 text figs.

In hyperimmunizing animals for the production of anti-anthrax serum the amount of reaction produced by successive doses decreases although the dose of infective material increases. But if a hyperimmunized animal be injected with subcutaneous exudate from an animal dying as a result of subcutaneous inoculation with anthrax there is produced an oedema at the seat of injection which varies in

amount with the dose. Experiments are quoted to show that antiserum produced by the use of oedema as antigen is more efficient than antiserum produced in the ordinary way.

The active substance is filterable and thermostable. Extract of spleen in saline produces a similar effect to the oedema, but to a far less marked extent.

The injection of oedema into animals not hyperimmunized leads only to a rise of temperature.

FRIEDHEIM (E. A. H.). Sur l'action du sérum normal de cheval dans le charbon expérimental du cobaye. [**The Action of Normal Horse Serum in Experimental Anthrax in Guineapigs.**]—*C.R. Soc. Biol.* 1927. Jan. 28. Vol. 96. No. 3. pp. 187–188.

The author briefly summarizes the views which have been expressed regarding the comparative values of normal horse serum and specific anti-anthrax serum for the protection of laboratory animals against infection with anthrax, and gives details of some experiments carried out. He did not find that horse serum conferred any degree of immunity. Anti-anthrax serum from the Pasteur Institute did confer a certain amount of immunity.

BERTHELOT (A.), RAMON (G.) & AMOUREUX. Recherches biochimiques sur les toxines et leurs dérivés. I. Étude des facteurs qui influencent l'élaboration de la toxine tétanique et sa transformation spontanée en anatoxine. [**Biochemical Investigations of Toxins and their Products. I. The Factors influencing the Elaboration of Tetanus Toxin and the Spontaneous Change into Anatoxin.**]—*Ann. Inst. Pasteur.* 1927. Feb. Vol. 41. No. 2. pp. 83–130. With 3 text figs.

Meat broth and spleen broth are equally good as regards the production of toxin, and the most favourable reaction is pH 6·7. The addition of mixtures of glucose and sodium pyruvate, or glucose and acid potassium phosphate, increases the amount of toxin to a greater extent than the addition of any of these separately. The addition of 8·3 g. of acid potassium phosphate, 2 g. of pyruvate of soda, and 5·5 g. of glucose per titre causes the pH to drop to between 5·5 and 5. Incubation for three months produces a pH of 6·5 to 5·5. The salts should be prepared in concentrated sterile solutions and added to the ordinary peptone broth. By the addition of 75 per 1,000 of tapioca cultures incubated for three weeks one obtains a toxin that is three or four times as powerful as that obtained in ordinary broth. Toxin is also formed in acid well buffered media.

PRIBRAM (E.). Die Gruppe des *B. septicaemiae haemorrhagicae.* [**The Haemorrhagic Septicaemia Group of Organisms.**]—*Centralbl. f. Bakt.* I. Abt. Orig. 1926. Dec. 7. Vol. 101. No. 1–3. pp. 78–79.

This is a reply to a charge made by CSONTOS that the author has worked with contaminated cultures.

NICOLAS (E.). Prévention et traitement des infections oculaires des animaux à l'armée française du Levant par les bouillons-vaccins de staphylocoques et streptocoques associés. [**The Prevention and Treatment of Diseases of the Eyes in Animals belonging to the French Army in the Levant by Vaccines of Staphylococci and Streptococci.**]—*Ann. Inst. Pasteur.* 1926. Dec. Vol. 40. No. 12. pp. 1075–1079.

This paper records reports received from veterinary officers regarding the treatment of suppurative conditions involving the eyes by vaccines prepared according to BESREDKA'S technique.

Generally speaking, the results were distinctly favourable, and particularly in cases where there were wounds.

DIKOMEIT (B.). Ueber ein einfaches Verfahren zur Konservierung lebender Bacterienkulturen. [**A Simple Method of preserving Living Cultures of Bacteria.**]—*Centralbl. f. Bakt.* I. Abt. Orig. 1927. Jan. 3. Vol. 101. No. 4–5. pp. 290–304.

Three pages of this article are given over to references to literature regarding the conservation of bacterial cultures. The method used by the author is that described by NISSLE in 1924.

A mixture of equal parts of anhydrous lanoline and liquid paraffin is sterilized in plugged flasks.

Cultures are made on plates and the growth is scraped off with a large loop and placed on the wall of sterilized test tubes. The lanolin-paraffin mixture is warmed to 38° C. and poured into the tubes covering the culture placed on the wall. It rapidly sets and the tubes thus prepared are placed in cold storage. When subcultures are required the media to be inoculated are warmed to 37–38° C. as are also the conserved tubes. Then growth is lifted out with the needle and spread well over the culture medium. In this way the author has preserved streptococci unchanged for a year, and subcultures have possessed all the characters of the preserved organisms. Pneumococci have been kept for 6 months, meningococci for 31 days, diphtheria bacilli for 7½ months, typhoid and Shiga-Kruse bacilli also for the same period.

TURNER (A. W.). **Wattle Disease of Fowls in Victoria.**—*Jl. Austral. Vet. Assoc.* 1926. Dec. Vol. 2. No. 4. pp. 127–129.

Wattle disease, which was investigated by SEDDON in 1914, is a condition in which there is acute oedema of the wattles, followed by necrosis, suppuration and distortion of the structure.

A bipolar organism has been isolated repeatedly. This causes fatal septicaemia when inoculated subcutaneously into rabbits, but does not cause any disturbance of health in fowls so inoculated.

Inoculated locally into the wattles the typical lesions of the natural disease are produced. It is exceptional for death to occur from septicaemia in naturally infected birds.

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HAGAN (William A.). **The Value of Placental Examination for the Diagnosis of Infectious Abortion of Cattle.**—*Cornell Vet.* 1926. Oct. Vol. 16. No. 4. pp. 274–278. With 1 plate.

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## DISEASES DUE TO FILTERABLE VIRUSES.

NESER (C. P.). **Blood Studies: a Contribution to the Study of the Blood and Circulation in Horse-Sickness.**—*Union of S. Africa. Dept. of Agric. 11th & 12th Reports of the Director of Veterinary Education and Research.* 1926. Sept. Part I. pp. 33–53. With 7 graphs.

In the advanced stages of dikkop the blood plasma acquires the property of causing the clumping of the red blood corpuscles. The poverty of the jugular blood in erythrocytes is probably accounted for by a combination of the agglutination of the corpuscles and enfeebled action of the heart. These favour retention of the red cells in the capillary system. This in turn reduces the peripheral resistance and allows the weakened heart to maintain a fairly bulky circulation in spite of the interference with its action by pericardial exudate. The dyspnoea is probably due to the inability of the heart to carry a sufficiently bulky circulation for oxygenation and the removal of waste products.

If oedema formation is rapid and extensive and if paralysis of the pharynx and oesophagus persist the jugular blood may become rich in cells, and the consequent increase in peripheral pressure may cause cardiac failure.

In peracute and mild cases, these changes are not observed, probably for the respective reasons that there is not sufficient time for the development of haemagglutinins or that a sufficient amount is not formed.

Leucocytes always tend to become reduced in number in the jugular blood, and their rate of reduction is an index of the severity of the disease.

MÉLANIDI (C.) & STYLIANOPOULO (M.). Notes sur la peste bovine en Grèce. [**Rinderpest in Greece.**]—*Rev. Gén. Méd. Vet.* 1927. Feb. 15. Vol. 36. No. 422. pp. 72–78.

In December, 1924, rinderpest made its re-appearance in Greece, and investigation indicated that it had been imported from Syria. It was admitted apparently that the quarantine regulations had not been rigidly enforced.

The authors note particularly that lesions occurred in many cases on the mucous membrane of the genital organs. The intestinal lesions were typical, but in no case were cutaneous eruptions seen.

Arrangements were made to prepare antiserum at once.

The disease was controlled by the slaughter of animals with visible lesions, the intravenous or intraperitoneal injection of 100–200 cc. of antiserum, and apparently healthy animals were given 30–50 cc. of antiserum subcutaneously.

In no case was piroplasmosis encountered as a complication among native animals, but in imported animals relapses to both *B. bigeminum* and *G. mutans* were met with.

The authors add details of certain other observations. Bone marrow preserved in cold storage was avirulent after two months and conferred no immunity. Two cubic centimetres of blood kept in cold store for nine days produced a mild thermal reaction only in a calf.

A calf which was housed in close contact with infected animals did not develop the disease until two months later. In one animal used as a

virus producer, the withdrawal of 5 litres of blood and its replacement with normal saline on the first day of fever, was followed by a temporary marked improvement in the animal. The next day the temperature rose again and the disease ran a typical course to a fatal termination.

RICHARDSON (U. F.) & CARMICHAEL (J.). **Epizootic of Rinderpest dealt with by Local Serum Production in an Outlying District of the Uganda Protectorate.**—*Jl. Comp. Path. & Therap.* 1926. Dec. Vol. 39. No. 4. pp. 311–317. With 2 text figs.

The outbreak occurred in an area known as West Nile, and populated by tribes breeding diminutive cattle of the zebu type. The cattle population is estimated at over 100,000 head. These animals are very susceptible to rinderpest. As Kenya Colony could not supply the serum required, it was decided to attempt production on the spot.

Three weeks sufficed to erect the four-roomed house with grass roof and cement floor, and the necessary equipment was transported from the Central Laboratory at Entebbe. The native suspicions were dispersed by demonstrations with 600 doses of serum available.

At first, naturally immune animals were used for hyperimmunization, but later, susceptible animals were used after they had been immunized by the simultaneous method. The technique varied a little from time to time as experience was gained. Virus producers were bled to death into citrate solution. This citrated blood was injected by gravitation intramuscularly (the gluteus maximus and longissimus dorsi. The blood was injected at 15 cc. per kilo. live weight. The average weight of the local breed was about 500 lb. The animals were bled for serum seven days after hyperimmunization. Serum producers were bled once a week for six weeks, and, after a week's rest, were hyperimmunized again. About 2½ litres of blood were taken at each bleeding. The blood was allowed 24 hours to clot and then a weight (500 grammes) was allowed to press the clot formed. The serum obtained was about 50 per cent. of the blood drawn. The serum was drawn off after a second 24 hours; for convenience it was stored in 25-litre wine flasks obtained from the Belgian Congo, with 1 part of 10 per cent. carbolic acid added to 20 parts of serum. After 2 months, 80 litres of serum were being produced weekly. Brews were tested on 5 to 10 susceptible animals in doses of 5 to 10 cc. per 100 lb. body weight with 2 cc. of virulent blood. A virus control was always included.

After eradication of the outbreak in cattle the danger of re-infection from game necessitated the double inoculation of over 35,000 animals in the northern part of the district. The southern part was protected by an immune belt.

The mortality following inoculation varied in different parts. In known clean cattle it was 2–4 per cent. In some areas it was as high as 9 per cent., but here other adverse factors were involved.

The titre of the serum varied considerably. The best serum was obtained from hyperimmunized naturally immune animals. 10 cc. of this was sufficient to block out a reaction in a 400–500 lb. animal.

The serum made from animals artificially immunized before hyperimmunization was not nearly so strong. It was given at the rate of 8 cc. per 100 lb.

*T. theileri*, *T. vivax* and *T. brucei* were recognized, and they appeared to be non-pathogenic until the vitality of the animals was lowered by inoculation.

KAKIZAKI (C.), NAKANISHI (S.) & OIZUMI (T.). **Experimental Studies on Prophylactic Inoculation against Rinderpest. Report III.**—*Jl. Jap. Soc. Vet. Sci.* 1926. Dec. Vol. 5. No. 4. pp. 221–280.

The authors describe experiments with a vaccine prepared from spleen pulp by incubation at body temperature. The details are not given in this report as they have already appeared in earlier ones.

The spleens are used from 24 to 72 hours after the rise of temperature.

A single dose is said to confer immunity, but if the vaccine is given during the period of incubation, it does not prevent the development of the disease. No controls were used in any of the tests because the virus used is said to have been absolutely infective. The dose used is about 0·5 cc. per kwan (3·75 kg.). The vaccine remains effective when stored for periods up to 3½ years. Vaccine made from lymphatic glands was inferior to that prepared from spleen pulp.

GERLACH (F.) & MICHALKA (J.). Ueber die im Jahre 1925 in Österreich beobachtete Geflügelpest. [**The Outbreak of Fowl Plague in Austria in 1925.**]—*Deut. Tierärzt. Woch.* 1926. Dec. 25. Vol. 34. No. 52. pp. 897–902. With 12 text figs.

In 1925 an outbreak of fowl plague occurred in Austria, and it is suspected that the disease was introduced from North Italy. The imposition of strict regulations prevented the outbreak from spreading very widely. Fowls, turkeys, geese and other birds died.

Infective blood mixed with normal saline or with glycerin retained its virulence for eight weeks, and in sealed tubes for three months. Organs preserved in 50 per cent. glycerin retain their virulence for 3 to 5 months, but putrefaction causes a rapid disappearance of the virus.

The period of incubation ranges from 24 hours to a week, with an average of two days.

The clinical symptoms include: Fever, dullness, loss of appetite, ruffling of the feathers, squatting on the ground, oedema of the eyelids, head and neck, haemorrhages in the conjunctiva, mucous nasal discharge, diarrhoea. In some cases acute parenchymatous changes were found in the solid organs at the post-mortem. Haemorrhages were found in the gizzard.

The occurrence of inclusion bodies in the brains of infected geese was confirmed.

NAKAMURA (N.) & KAWAMURA (Y.). **An Experimental Study on the Virus of Fowl Pest. I. On the Susceptibility of the Pigeon.**—*Jl. Jap. Soc. Vet. Sci.* 1926. Dec. Vol. 5. No. 4. pp. 281–294.

Provided sufficiently large doses are given, the virus is transmissible to the pigeon by feeding or by inoculation, but the disease does not spread by simple contact. The virus can be passed through pigeons in series and still remain infective for the fowl.

NAKAMURA (N.), FUTAMURA (H.) & WATANUKI (T.). **On the Practical Value of Several Serological Reactions for the Diagnosis of Contagious Pleuro-pneumonia of Cattle.**— *Jl. Jap. Soc. Vet. Sci.* 1926. Dec. Vol. 5. No. 4. pp. 296–318.

The authors find the precipitin and agglutination tests unsatisfactory, both because of failures to identify certainly infected animals, and because of positive reactions with healthy controls.

With satisfactory antigen the complement fixation test is reliable. The antigen was prepared as follows: A 10-day old culture on 3 per cent. horse serum agar (3 per cent.) was emulsified, after removal of the water of condensation in 3 cc. of saline. This was heated at 60° C. for three hours and then carbolized to the extent of 0·5 per cent.

MOHLER (J. R.). **Foot and Mouth Disease. With Special Reference to the Outbreaks in California in 1924 and Texas in 1924 and 1925.** *U.S. Dept. of Agric. Dept. Circular 400.* 1926. Dec. 82 pp. With 12 text figs.

This Circular gives particulars regarding the outbreaks of foot-and-mouth disease in California and Texas in 1924 and 1925.

The infection was traced in the California outbreak to feeding with garbage from the Mare Island Navy Yard, but it could not be traced to any particular ship. Many of these had obtained supplies in Eastern Ports and the garbage unloaded contained a great deal of meat. The spread of the disease and the methods used for control and eradication are described. Quarantine, slaughter and disinfection were relied upon. In handling large mobs of cattle these were driven into a trench dug with a steam shovel and there shot. All carcases were eviscerated, covered with quicklime, and then the trench was filled in.

In outbreaks occurring in packers' yards as many as possible of the animals were slaughtered for food in the usual way. Rigid ante- and post-mortem examinations were carried out.

The problem was complicated by the appearance of the disease in deer on the ranges and an attempt was made by a group of individuals to obstruct and even prevent the work of investigation and control among these animals.

Active work among infected deer was carried on from November, 1924 to July 1925, during which period 20,819 deer were destroyed. The percentage of those showing evidence of infection ranged from 8·9 to 37·25 weekly.

The lesions found in cattle and deer are described and there is also an account of lesions resembling those of foot-and-mouth disease.

The Texas outbreak began on September 27th, 1924, and in this case suspicion for the source of infection rested upon ships' crews coming ashore. There was some evidence to show that the tank water supply might have become infected through such men washing their clothing in it.

The outbreak was limited and was eradicated within 30 days of the expert control being instituted.

There was a recurrence 10 months later.

In discussing the general results of the work of eradication reference is made to the susceptibility of the guineapig to vesicular stomatitis, and it is emphasized that, in view of this, guineapig inoculation should not be relied upon alone for the recognition of the disease.

KUNIKE (G.). Experimentelle Untersuchungen über die Möglichkeit der Uebertragung der Maul- und Klauenseuche durch Fliegen. [**Experiments regarding the Possibility of Flies carrying the Virus of Foot and Mouth Disease.**]—*Berlin. Tierärzt. Woch.* 1927. Feb. 25. Vol. 43. No. 8. pp. 123–126.

The experiments detailed show that flies are not specific hosts for the virus, and that as mechanical carriers of the infection their possible rôle is strictly limited.

LEVADITI (C.), GALLOWAY (I.) & NICOLAU (S.). Essais de culture du virus aphteux dans le cerveau de lapin. [**Attempts to cultivate the Virus of Foot and Mouth Disease in the Brain of the Rabbit.**]—*C.R. Soc. Biol.* 1927. Feb. 18. Vol. 96. No. 6. pp. 395–397. With 1 text fig.

The authors state that while the results of the intracranial inoculation of rabbits with the virus of foot-and-mouth disease have been usually negative, they have succeeded in one instance in carrying it on through three passages.

RUPPERT (F.) & ROTTGARDT (A.). Ueber eine neue Art der Herstellung von Maul- und Klauenseuche Antiserum und seine Wirksamkeit. [**A New Method of preparing Foot and Mouth Disease Serum and its Effectiveness.**]—*Berlin. Tierärzt. Woch.* 1926. Dec. 24. Vol. 42. No. 52. pp. 897–898.

According to the authors the virus of foot-and-mouth disease remains localized at the point of entry and does not gain the blood stream until five hours have elapsed. They hold that the period of infectivity of the blood is in reality longer than has been generally thought. The blood and the internal organs are, they believe, infective up to 3 or 4 days.

Blood in quantities of 6 and 8 litres respectively was drawn from two calves when at the height of a temperature reaction due to intravenous inoculation. The blood was citrated to prevent clotting, and injected intraperitoneally into two cows. A fortnight later the cows were bled and the serum obtained was mixed.

This serum was sent from the Argentine to Germany for test, and it was reported that 0·1cc. protected a guineapig against generalization. Testing the serum on a large scale, 19 bovines were given 10 cc., 21 received 20 cc. and 20, 30 cc. of the serum, and there were 40 untreated controls.

These animals were pastured where they were in close contact with infected herds. Within a few days 40 per cent. of the controls but none of those which had been given serum were infected. A similar test was carried out using 147 animals with 225 controls. Doses of 10, 20, and 30 cc. of serum were used as before. About 60 per cent. of the controls, 3 animals which had had 10 cc. and one which had had 30 cc. became infected on the tenth day.

In a third test 15 animals were used, 5 with each of the doses used before. These animals were mixed with 453 animals among which the disease was rife; none of the protected animals became infected.

LEVADITI (C.), NICOLAU (S.) & SCHOEN (R.). Recherches sur la rage. [**Rabies Investigations.**]—*Ann. Inst. Pasteur.* 1926. Dec. Vol. 40. No. 12. pp. 973–1069. With 1 plate in colour, 14 figs. 19 charts.

The authors believe that the virus of rabies is a micro-organism which resembles the Microsporidia of the Family Glugeidae. While it bears striking resemblances to *Encephalitozoon cuniculi*, it is not justifiable to conclude that the two are identical. They propose the name *Glugea lyssae* for the parasite.

The parasite passes through a complicated life cycle which is at present known only in part. The phase which is best known is the intracellular pansporoblast stage.

It is probable that there exists a stage of spores or amoeboid germs, which are the multiplicative forms and which are ultra-microscopic. Nothing is known regarding the morphology of this phase.

The pansporoblast phase is not essential; rabies can develop without it. The fixed virus is a variant of the parasite produced by mutation. It is probable that there are numbers of varieties of the parasite. The fixed virus is a strictly neurotropic variety for the species of animal in which the mutation has been effected.

It is important to establish that there may exist in nature strains of *Glugea lyssae* which possess the characters of the fixed virus. This may explain the mutability of street virus by passage through rabbits.

Finally, there appears to be a certain degree of antagonism between the fixed virus and the pansporoblastic variety of *Glugea lyssae* (street virus).

REMLINGER (P.). Note sur les virus de rue envoyés de Tanger à M. Levaditi. [**A Note on the Street Viruses sent to Levaditi from Tangier.**]—*Ann. Inst. Pasteur.* 1926. Dec. Vol. 40. No. 12. pp. 1070–1074.

This short paper gives the histories of 12 viruses sent to LEVADITI for his experiments.

MIESSNER (H.) & BAARS (G.). Immunisierung gegen Lyssa der Hunde mit Lyssin. [**Immunization of the Dog against Rabies by means of Lyssin.**]—*Centralbl. f. Bakt.* I. Abt. Orig. 1926. Dec. 7. Vol. 101. No. 1–3. pp. 79–108.

Since 1915 there has been a marked rise in the number of cases of rabies in Germany, particularly among dogs, and the number of persons undergoing inoculation is now about four times as large as it was at that date. Among the causes for this are the disorganization of the veterinary police services as a result of the war, and the increase in the dog population.

In countries having land frontiers, general protective inoculation of dogs against rabies would no doubt be the safest method of protection, but it would be too costly. The authors devote several pages to a review of the literature regarding protective inoculation against rabies before passing on to describe their own experiments.

The majority of these were carried out with fixed virus from Breslau, a strain that has been in use for many years for the protective inoculation of human beings.

From the results of experiments carried out on 53 dogs which were inoculated, in some cases once and in others twice, either intra-abdominally or subcutaneously, it was concluded that by this means protection can be conferred, that the degree of immunity varies with the virulence and dose of the virus used. The Breslau virus in doses of 1 to 1·5 g. did not produce rabies in any of the dogs small or large, and conferred a safe degree of immunity against subsequent intramuscular inoculation.

Forty dogs were inoculated with carbolized glycerinized virus. One of these died of rabies. None of the survivors died of rabies when inoculated with virus later. The dose, however, is large and, probably on account of the glycerin it contains, it not infrequently leads to abscess formation at the seat of injection. Further, vaccine prepared according to the Japanese technique cannot be used after two or three weeks.

The dry virus " Lyssin " is prepared as follows. The brain and cord of rabbits dead of fixed virus are ground up in a mortar with powdered chalk, the proportion being 5 of nerve tissue to one of chalk. This not only makes the grinding more effective, but it helps to remove the fat. Three volumes of normal saline are added and the resulting emulsion is strained through muslin. The filtrate is evaporated to dryness in 24 hours in a Faust-Heim exsiccator at 24° C. The temperature is important. The dried virus is pulverized and weighed. 0·364 g. of " chalk-lyssin " corresponds with 1 g. of the fresh fixed virus. This is stored in corked flasks the necks of which are paraffined. When required for use the powder is ground up with 3 times the quantity of normal saline.

Fifty dogs were inoculated with doses of Lyssin corresponding to 0·45 to 2·5 g. of fresh virus, and 70 received doses corresponding to 0·9 g. of fixed virus.

Two dogs which received 1·5 and 2·5 g. died of rabies.

After some of the animals had been set aside for later testing, 95 dogs were inoculated with street virus. Two of these died of rabies.

Lyssin can be used for periods of at least nine weeks after preparation, and experiments showed that the immunity lasts for at least a year.

Experiments failed to produce evidence that animals inoculated with Lyssin could infect susceptible dogs by biting, nor were their saliva and central nervous systems virulent when tested by inoculation.

COSTA (S.), BOYER & PLACIDI (L.). Essai de vaccination antirabique par un vaccin formolé. [**Attempts to vaccinate with an Anti-Rabic Formolized Vaccine.**]—*C.R. Soc. Biol.* 1927. Feb. 4. Vol. 96. No. 4. pp. 293–294.

The authors have prepared a vaccine in the following manner: The brain of a rabbit dead on the 9th day after intracranial inoculation with fixed virus is finely triturated with 10 cc. of normal saline. The emulsion is strained through gauze and formolized to the extent of 1 in 300. In half an hour the emulsion is sterile. Five cubic centimetres of this, which correspond to half the brain, are injected subcutaneously in the lumbar region. For intracutaneous vaccination the same vaccine is rubbed into a square decimetre of shaved skin on the abdomen and a square of gauze soaked in the vaccine is bound in place under a waterproof cover.

Other rabbits are given two injections of 2·5 cc. at a 5-days interval. When tested 15 days later by intracranial inoculation with fixed virus these animals all die.

Series of rabbits are given 4 subcutaneous inoculations of vaccine, prepared 30 hours before and kept at room temperature, in doses ranging from 0·5 to 2 cc. at varying intervals. When tested fifteen days later by intra-ocular inoculation, they resist infection, but die in the ordinary way, when inoculated intracranially later. Daily instillation of the vaccine into the eye for eight days, and intracranial injection of 1 cc. of the vaccine fail to protect against intra-ocular injection of the same virus.

Another method of preparing vaccine that has been tried is as follows : The brains of two rabid rabbits are triturated with 40 cc. of normal saline. The emulsion is centrifuged for half an hour at 5,000. Twenty cubic centimetres of supernatant liquid is formolized to 1 in 1,000 (A). The sediment is shaken up in the remainder of the liquid and formolized to 1 per cent. (B). Series of rabbits inoculated (path not stated) 15 times with the two vaccines resist intra-ocular inoculation with fixed virus, and similar results are obtained after 8 injections of 2 cc. on every other day. Such rabbits succumb to intracranial inoculation.

PLANTUREUX (Edm.). Traitement antirabique des animaux par un vaccin formolé. [**The Antirabic Treatment of Animals by Formolized Vaccine.**]—*Rev. Gén. Méd. Vét.* 1926. Nov. 15. Vol. 35. No. 419. pp. 619–624.

A vaccine for veterinary use must not only be effective and free from danger, but must also fulfil the following condtions. It must require only a few injections, it must not be expensive, and it must be capable of being used at a distance from the laboratory.

The author has carried out experiments with a 10 per cent. emulsion of dog's brain (the dog having died from infection with fixed virus), in a 1 per 2,000 solution of formalin in distilled water. He had favourable results when the vaccine was given prior to infection, but they were less satisfactory when it was administered after infection. These latter he attributes to rabic toxin.

In preparing the vaccine the following technique has been finally fixed. The brain of the dog is emulsified after grinding in a mortar with 9 parts of 4 per thousand formalin. This is filtered through gauze, and kept for a week at 10–15° C. It is then centrifuged and the supernatant liquid is replaced by salt solution.

Experiments indicated that the immunity was to some extent proportional to the number of doses of vaccine given, and that there should be a fairly long interval between doses. Dogs which received 10 cc. followed at an interval of 17 days by 30 cc. were better protected than those which received 30 to 50 cc. in two or three doses at intervals of one or two days.

MARIE (A. C.). Pouvoir pathogène du virus rabique fixe. [**The Pathogenicity of the Fixed Virus of Rabies.**]—*Ann. Inst. Pasteur.* 1927. Jan. Vol. 41. No. 1. pp. 45–48.

As a result of experiments carried out with rabbits and guineapigs, the author finds that the fixed rabic virus of the Pasteur Institute at Paris has not undergone any modification. A six-day cord is pathogenic for the guineapig by intracranial injection, but guineapigs and

not rabbits must be used for the test. The virulence does not always vary directly with the age of the cord. In guineapigs there is no prolongation of the period of incubation in proportion to the age of the cord.

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BARBIER (A.). Une epizootie de rage sur le renard. [**An Epizootic of Rabies in the Fox.**]—*Rev. Gén. Méd. Vét.* 1926. Nov. 15. Vol. 35. No. 41. pp. 609–618.

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## MYCOTIC DISEASES.

LAJOS (T. V.). La fórmula leucocitaria en la linfangitis epizoótica. [**The Leucocyte Formula in Epizootic Lymphangitis.**]—*Revist. Hig. y Sanidad Pecuarias.* 1926. Nov. Vol. 16. No. 11. pp. 765–768.

The following is a translation of the author's French summary :—

In 79·8 per cent. of cases the leucocyte formula of horses affected with epizootic lymphangitis is normal. In the others the count is below normal. The neutrophiles never number as many as 76 per cent. It is easy to distinguish between farcy and epizootic lymphangitis by comparing the leucocyte formulae. In epizootic lymphangitis the number of leucocytes never exceeds 12,000 per c.mm. In farcy it often reaches 20 to 60 thousand. The percentage of neutrophiles is also a clear indication. In epizootic lymphangitis it is normal, and in farcy it is much higher.

OCÁRIZ (J.). La autoseroterapia en el tratamiento de la linfangitis epizoótica. [**Autoserum-Therapy in the Treatment of Epizootic Lymphangitis.**]—*Revist. Hig. y Sanidad Pecuarias.* 1926. Dec. Vol. 16. No. 12. pp. 854–864.

The following is a translation of the author's French Summary :—

Autoserum-therapy is a valuable adjuvant in the treatment of epizootic lymphangitis, no matter what method of treatment is resorted to.

At least 800 cc. of serum should be injected at a dose, and even a litre may be exceeded without ill effect. An interval of at least 15 days should be allowed to elapse between doses, but the condition of the lesions is the best index as to when the serum should be repeated.

The serum should be injected in such a manner so as to form a barrier round the lesions.

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## MISCELLANEOUS.

ROSS (I. Clunies). **An Experimental Study of Tick Paralysis in Australia.** —*Parasitology.* 1926. Dec. Vol. 18. No. 4. pp. 410–429. With 2 text figs.

The author has observed many experimental cases of tick paralysis in the dog, due in every instance to *Ixodes holocyclus*. These were reared from immature stages taken from bandicoots caught near Sydney.

The interval elapsing between attachment and symptoms is variable, depending apparently upon the degree of engorgement, and is never less than five days. The period of incubation tends to be longer in winter than in summer.

There are no premonitary symptoms. The first constant symptom is a slight degree of inco-ordination affecting the hind legs and this progresses so rapidly that within 2 or 3 hours the dog may not be able to stand. Gradually the whole body becomes involved. If food or water are swallowed there is violent retching, but vomition does not occur until the later stages.

Sensibility appears little affected, and consciousness is not impaired until the very late stages.

The cardiac function is little disturbed, and defaecation and urination are not affected while the dog can stand.

Death appears to be due to respiratory paralysis. The heart may go on beating for several minutes after respiration has ceased.

No recovery has taken place when the paresis was such as to prevent a dog from standing.

On post-mortem examination anatomical lesions are absent or inconspicuous.

Histological examination of the central nervous system shows only minor changes of a vascular nature.

The facts appear to suggest that the toxin does not act peripherally, but upon the motor neurones of the anterior horns and on the nerve cells of the cranial nerve nuclei.

Although tick paralysis is due to the adult female ticks only, certain pathological effects have been observed to follow infestation with immature stages of *Ixodes holocyclus* and other species.

Extensive infestation of man with larvae causes intense irritation, and in some cases head ache and nausea. In no case has paralysis been produced.

In the author's experiments he has been unable to discover any causal organism. Nor has he been able to produce the disease in dogs by inoculation. The facts do not appear to suggest an infective disease since the period elapsing before symptoms occur seems to depend upon the rate at which engorgement takes place. Further, if ticks are removed before symptoms occur, even when left until engorgement is nearly complete, attacks do not develop.

Experiments show that the host upon which the immature stages engorge themselves has no influence upon whether such a tick proves pathogenic or not as an adult. It is believed that a toxin derived from the salivary glands of the tick is the cause of the condition. The maximum amount of secretion is poured out by the salivary glands two days before engorgement is complete. An emulsion of salivary glands produced a rise of temperature and vomition when injected into a dog.

The mixing of an emulsion of salivary glands with blood delayed coagulation, but there was no evidence of haemolysin.

There is as little experimental evidence regarding the production of immunity, but what there is tends to suggest that an attack confers some degree of resistance.

COWDRY (E. V.). **A Group of Micro-Organisms transmitted hereditarily in Ticks and apparently unassociated with Disease.**—*Union of S. Africa. Dept. of Agric. 11th & 12th Reports of the Director of Veterinary Education and Research.* 1926. Sept. Part I. pp. 147–158. With 3 plates.

The organisms found resemble Rickettsia, but were definitely larger. Their distribution was limited to the malpighian tubules and although

they resembled the symbionts of certain lice and blood-sucking flies, they differed from these in that the latter inhabit the digestive tract.

The organisms are bacterium like, and intracellular in position. They are pleomorphic, gram-negative and stain less intensely than ordinary bacteria with basic dyes. They have been detected in the following species: *Amblyomma americana, Argas persicus, Boophilus decoloratus, Dermacentor variabilis, Dermacentor venustus, Haemophysalis leachi, Hyalomma aegyptium, Margaropus annulatus, Margaropus annulatus australis, Ornithodorus megnini, Ornithodorus turicata, Rhipicephalus appendiculatus, Rhipicephalus evertsi, Rhipicephalus sanguineus,* and *Rhipicephalus simus.*

Apart from physical distension of invaded cells there was no evidence of abnormality in the tissues affected.

Their detection in the eggs, larvae, and other stages of the life cycle indicates hereditary transmission.

COWDRY (E. V.). **Cytological Studies on Heartwater. I. The Observation of *Rickettsia ruminantium* in the Tissues of Infected Animals.** —*Union of S. Africa. Dept. of Agric. 11th & 12th Reports of the Director of Veterinary Education and Research.* 1926. Sept. Part I. pp. 161–177. With 2 plates (1 coloured).

The experiments have been carried out with virus which was readily transmitted from animal to animal by inoculation. Cattle, sheep, and goats were used. The period of incubation is about 10 days. As controls there were the following: 3 sheep and 3 goats, which presented no appearance whatever of illness, 12 sheep bled out in the preparation of blue-tongue vaccine, 4 killed at an advanced stage of jagdsiekte, 2 cattle dead of snotsiekte, and 1 of lamsiekte. The appearance of the bodies in the spleen coincided with a phase of the febrile reaction. They were restricted to the endothelial cells, and the clumps were surrounded by a zone of rarefaction, and they were always disposed towards one side of the nucleus, and never surrounded it as intrinsic cellular granules do.

In no case did the presence of the organisms in the cells cause any abnormality of appearance other than simple distension. In a tabular statement the author draws comparisons between the Rickettsia of Mountain Spotted Fever, Typhus, and Heartwater.

The organism is most readily detected in the epithelium of the glomeruli of the renal cortex and in the capillaries of the cerebral cortex.

MALEVAL (E.). Contribution à l'étude du Lathyrisme chez le cheval et le mulet. [**Lathyrism in the Horse and Mule.**]—*Rev. Vét.* 1927. Feb. Vol. 79. No. 2. pp. 69–89.

According to the author all animals dead of lathyrism show evidence of asphyxia. If the disease has been in existence for not more than a month the larynx appears to be normal. In cases of two months standing there is " emaciation " of the muscles of the left side of the larynx. At four months atrophy of the muscles is complete. The author deals with the theories that have been put forward to explain the causation of the condition.

VAN ZYL (J. P.). **Note on the Decomposition of Diluted Polysulphide Dips.**—*Union of S. Africa. Dept. of Agric. 11th & 12th Reports of the Director of Veterinary Education and Research.* 1926. Sept. Part I. pp. 139–143.

Although the tests carried out were not exhaustive, the indications were that the decomposition of the dip is neither so rapid nor of such a nature as to preclude its being used for both first and second dippings where flocks are small.

DOBELL (Clifford). **A Note on the Generic Name of the Spirochaete of Syphilis** (*Treponema pallidum* **Schaudinn, 1905**).—*Parasitology.* 1926. Dec. Vol. 18. No. 4. pp. 368–369.

Since the spirochaetes are bacteria and not protozoa their nomenclature must be governed by Botanical and not by Zoological Rules. Three names were proposed for the spirochaete of syphilis in 1905, and these in order of priority were Spironema, Treponema, and Microspironema.

Since Spironema is already occupied in botanical nomenclature, the name Treponema stands.